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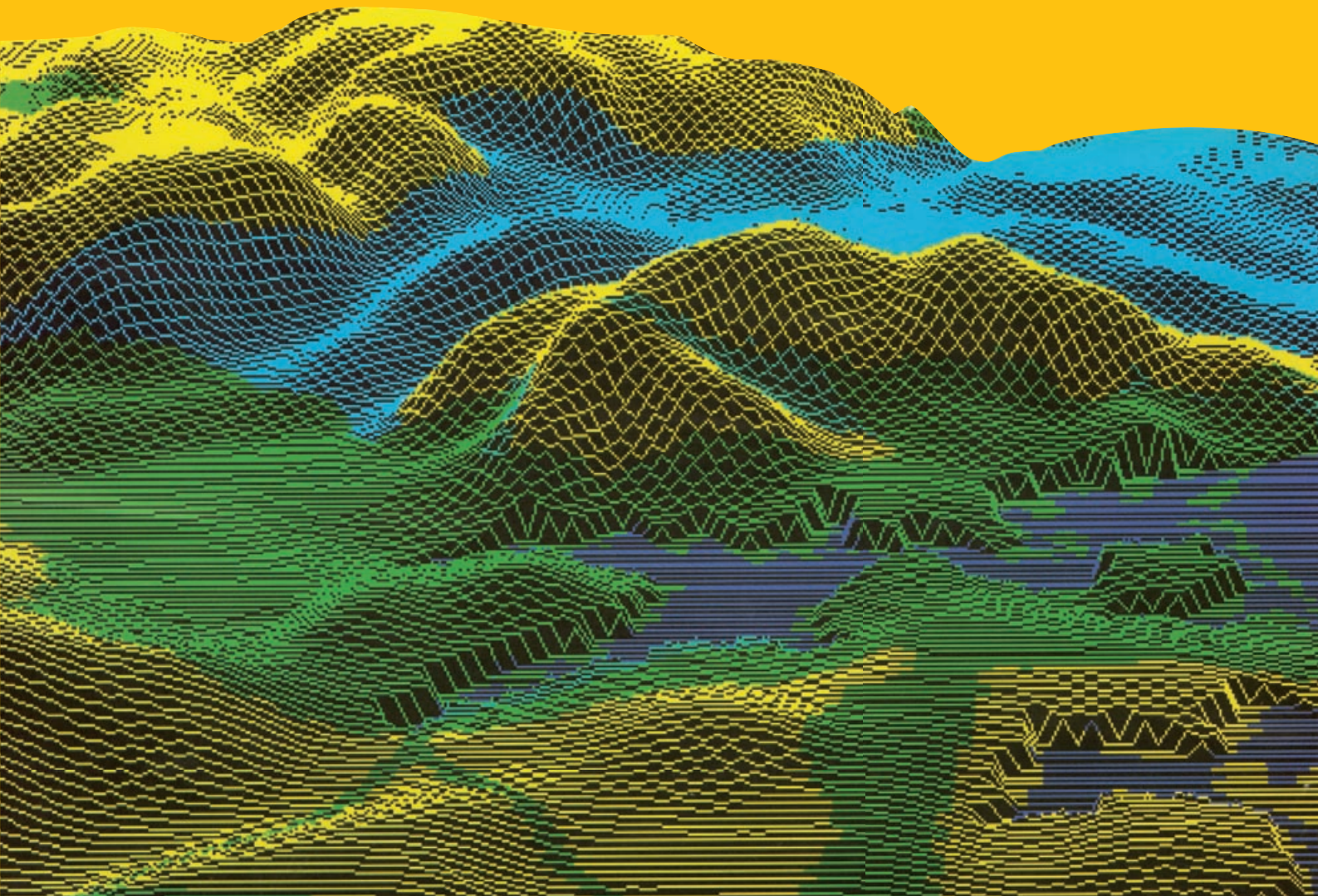

Fig. 4: Selected buildings in Lutynia *(Photo J. Oleszek)*
a) an inhabited farmstead, b) a multi-functional building deserted in 2004, c) a farmstead used as a holiday house

Fig. 5: Wrzosówka – general view *(Photo J. Oleszek)*
1) ruins of a livestock building, 2) a holiday house, 3) the St. Boromeus Chapel

Illustrations related to the paper by J. Oleszek

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WATER EROSION IN THE WATERSHED OF THE UPPER OSTRAVICE RIVER FROM 1976 TO 2000

Ladislav BUZEK

Abstract

Water erosion is an important degradation agent as it depends on natural forces as well as anthropogenic factors (for example, the use of tractor technology in the development of mechanization in the forest industry). Research on water erosion has been organized by the Department of Physical Geography of Ostrava University, from 1976 to 2000, in the Moravskoslezské Beskydy Mts. in the Upper Ostravice River Watershed in the NE part of the Czech Republic. The main results of an analysis of the suspended load regime are presented here. Suspended load, as a transitional part of the erosional products, is evidence of the intensity of erosional processes. In the observed catchment area of the Upper Ostravice R., suspended load sediments in the Šance Dam reached their maximum in 1997, when as a result of regional precipitation the concentration exceeded 15 g.l^{-1}.

Shrnutí

Vodní eroze v povodí horní Ostravice v letech 1976 – 2000

Eroze je přirozený morfogenetický činitel, jehož intenzita a průběh závisí jak na přírodních činitelích, tak i na činitelích antropogenních (používání traktorové technologie, spojené s budování lesních komunikací). Ve středohorském reliéfu Moravskoslezských Beskyd v povodí horní Ostravice nad vodárenskou nádrží Šance byl katedrou fyzické geografie sledován plaveninový režim uvedeného povodí od roku 1976 do roku 2000. Tranzitní část produktů eroze – plaveniny jsou vodou přenášeny do vodárenské nádrže, kde z 90 % sedimentují. Od roku 1976 se vodní eroze projevila nejvíce v r. 1997, kdy okamžité koncentrace plavenin přesahovaly 15 g.l^{-1}, což bylo dáno intenzivními regionálními srážkami.

Key words: *erosion, suspended load, Moravskoslezské Beskydy Mts., Czech Republic.*

1. Introduction

Water erosion is largely determined by the amount and intensity of precipitation (both snow melt water and rainfall), by bedrock type and lithology, vegetation cover and geomorphological processes. These natural factors may affect the physical and chemical properties of soil and result in the reduction of soil fertility or, eventually, soil loss. The intensity of these procesess is usually modified by human activity (e.g. logging, forest road construction, the use of heavy machines, etc.).

This paper presents the results of the forest soil erosion research in the Upper Ostravice River watershed (the Moravskoslezské Beskydy Mts., NE part of the Czech Republic; see Fig. 1), carried out in years 1976 – 2000 using a range of methods of both field work and cameral data interpretation (see below). Two different series of results were compared, based on the measurements carried out by two different organisations, namely Ostrava University (OU) and the Hydrometeorological Institute in Ostrava (ČHMÚ)[1]. The final results in each case are affected by the methods of sampling and the subsequent analyses used.

Methodologically, the study refers to the works by Stehlík (1969, 1971). In the field, samples of water with suspended load were taken at the hydrometric river profile by the Staré Hamry gaging station (near the place where the Ostravice River joins the Šance Water Dam), at three intervals daily – 7 a.m., 2 p.m. and 8 p.m. At the Department of Geography of the former Pedagogical Faculty in Ostrava (after 1989 the Physical Geography Department of the Faculty of Science in Ostrava), the samples – 0,2 l each – were dried and weighed. The resulting amount of suspended load was multiplied by five to get values per litre. In contrary, the Hydrometeorological Institute in Ostrava took their samples at 7 a.m., each being one litre in volume. The data on precipitation, snow melting and water discharge in the Ostravice River Watershed (for the hydrometric profile at Staré Hamry, see above) were provided by the

[1] The research by the Hydrometeorological Institute in Ostrava was only carried out in years 1985 – 1997.

Hydrometeorological Institute in Ostrava, too. Details on the dates of logging and the use of heavy machines at work in the Ostravice River Watershed (72.96 km^2) were obtained from the former Lesnický závod Institute in Ostravice and the Ústav pro hospodářskou úpravu lesů (ÚHÚL) Institute in Frýdek-Místek.

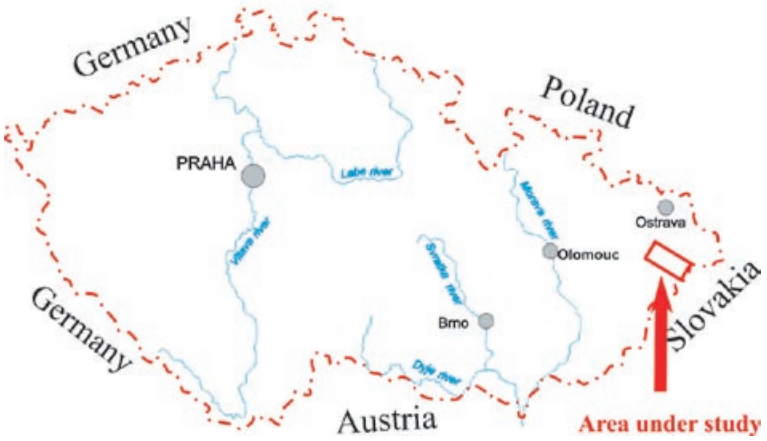

Fig. 1: Area under study.

2. Erodology and mechanical soil degradation

Erodology, the branch of science dealing with the mechanical soil degradation, was first promoted by Zachar (1970) in the former Czechoslovakia. There are several types of erosion he mentions. During water erosion, which is the main focus of this study, the rainfall and snow melt-water interact with the soil and bedrock, resulting in the erosive wash and the formation of rills and gullies. In many cases, the deeper erosive landforms reach the groundwater level and are thus run through by water for most of the year, which may imply their fast up-the-stream extension. Selective erosion, as another type, then involves the transport of the finest soil particles including the humus, thus affecting especially soil quality.

As it was mentioned above, the study deals with water - or aquatic - erosion (Holý, 1994), which is the most dominant type in the area studied. To learn more about the other erosion types, the reader is referred to literature, esp. Zachar (1970, 1980), Jařabač (1979) and Krečmer (1983).

There are many ways of assessing water erosion. In this paper, the soil loss and the rate of pedological processes are analysed on the example of the model watershed (Upper Ostravice River, Moravskoslezské Beskydy Mts.). If the erosion is compensated for by the soil formation, it is referred to as normal erosion. However, the natural factors determining soil erosion can be largely influenced by the human activity, e.g. the use of heavy machines (tractors and trucks) on the unpaved forest roads, which may result in a considerable increase of solid matter and sediment content in the streams.

Zachar (1980) and other authors classify the rate of water erosion into six intervals according to its intensity (Tab. 1).

Class	Intensity of the soil loss by means of erosion ($m^3.ha^{-1}$ per year)	Intensity of the soil loss by means of erosion ($t.ha^{-1}$ per year)	In words
1	up to 0.5	0.92	Negligible
2	0.51-5	0.93-6.8	Low
3	5.1-15	6.9-27	Medium
4	15,1-50	27.1-90	High
5	50,1-200	91.1-360	Very high
6	more than 200	more than 360	Catastrophic

Tab. 1: Classification of the surface erosion according to its intensity (Zachar, 1980).

The intensity of water erosion can be evaluated from the suspended load amount in the samples taken from the selected river and gully profiles. It was Zachar (1980) who proposed to assess the intensity of water erosion according to the content of insoluble particles and the suspended load unit-yield (Tab. 2). This method was applied by the author in his research, too.

According to the evaluation of the suspended load unit-yield, carried out in years 1976-2000, the Upper Ostravice watershed represents areas with mostly medium to very high intensity of erosion. In 1996 and 1997, however, the values measured exceeded the other years considerably, with the suspended load unit-yield as much as 1,016 $t.km^{-2}$ and 3,458 $t.km^{-2}$ respectively, the latter reaching the exceptional erosion intensity class[2].

[2] The values refer to the suspended load amount only, as the samples were pipetted after 24 hours of sedimentation.

The intensity of erosion	The amount of insoluble particles in the sample (g. m^{-3})	The suspended load unit-yield (t.km^{-2})
Negligible	up to 30	up to 15
Low	30.1-100	15.1-50
Medium	101-350	51-150
High	351-1000	151-500
Very high	1001-3500	501-1500
Exceptional	more than 3500	more than 1500

Tab. 2: The classification of erosion intensity based on the suspended load content and its unit-yield (Zachar, 1980).

3. Geology and geomorphology of the Upper Ostravice watershed

The relief of the Upper Ostravice River watershed, and especially the Velký potok and Červík tributaries, is quite varied due to diverse lithology[3]. The peaks in the north of the drainage basin exceed 1,000 m a.s.l. (Lysá hora Mt. – 1,323 m), on the other hand, in the middle and southern parts they seldom reach 950 m a.s.l. (Trojačka 938 m, Beskyd 900 m, Sulov 942 m, etc.). The divide ranges between particular watersheds are built by relatively rigid, thick-bedded sandstones and agglomerates of the Middle Godula Member (Buzek, 1981). Generally, the bedrock type and rock strength determine many morphometric parameters in the area, especially slope gradients, the density of drainage (and erosive) network or the texture of soil and geest (Tab. 3).

As we can see from Tab. 3, soils and geest in 68% of the Upper Ostravice River watershed area are formed mainly by fine-grained particles smaller than 0.05 mm. This fraction occurs especially on the outcrops of shales and thin-bedded sandstones. These areas, consequently, have suitable conditions for the development of valley network – its average density reaches 1.9 km.km^{-2}. However, it is necessary to consider also the unpaved forest roads where rills and gullies develop frequently – their density varies from 0.85 to 1.25 km.km^{-2}, depending on the locality. All in all, in the mountainous region such as the Moravskoslezské Beskydy Mts., it is the network of rills, gullies and forest roads that is the main source of sediments in streams. Its detailed characteristics can be found in studies by Buzek (1981, 1988, 2000, 2001a), which also include data from other watersheds in the Beskydy Mts.

There is a close relationship between the bedrock type and the intensity of erosion. Slopes built predominantly by shales and weathered thin-bedded sandstones typically have high density of erosive network (usually exceeding 2, sometimes even 3 km.km^{-2}). In contrary, slopes formed by relatively rigid and thick-bedded sandstones and agglomerates (esp. those of the Upper Godula Member) reach values only around 1 km.km^{-2} (e.g. Lysá hora Mt. – 1.14 km.km^{-2}). Moreover, the higher the rock strength is, the steeper the slopes (see Tab. 3).

4. Forest soil erosion – natural processes vs. forest management

Generally, the forest has a very important role in protecting soil against erosion. Its system of roots slows down the surface runoff and enhances the infiltration of water, moreover, it prevents the occurrence of shallow landslides. In addition to this function, its considerable role in mitigating the onset and course of floods has been studied already since 19th century as a part of the forest management.

The intensity of erosion differs profoundly if arable land and forest soil are compared. For instance, in the Lomná River watershed (eastern part of the Moravskoslezské Beskydy Mts.) the agricultural land covers much larger area than in the Upper Ostravice drainage basin (Buzek, 2005). This results in relatively faster onset of the mechanical turbidity in the streams of the Lomná River watershed. In late March 1987, the turbidity in the Lomná River (caused by snow melting) occurred as early as on March 25, contrary to the Upper Ostravice River where it was only observed two days later, on March 27. A month later, the opposite situation was the case, with the snow still melting in the higher, forested parts of the Upper Ostravice watershed, while the arable land in the Lomná River area was already bare of snow (see Buzek, 1989).

The canopy, humus and the root system of the trees slow down the runoff of both vertical and partly also horizontal precipitation, thus reducing the erosive processes. However, with the development of industry in the past, the timber production gained higher priority than the protective function of forests. In the 1930s, fortunately, there was a change in perceiving this problem, as Válek (1977) describes. In his study, he presents the results of a 25-year monitoring of small watersheds, namely of the Kychová Brook (95% of the watershed forested) and the Zděchovka Brook (only 4% forested) in the Javorníky Mts. Both drainage basins have approximately the same area (4 km^2) and are formed by the same bedrock with similar geomorphological processes occurring, too. It is in the small drainage basins like these that the decisive role of forests in regulating the runoff (and thus erosion, too) is best visible.

[3] For detailed information on geology of the Moravskoslezské Beskydy Mts. see Menčík (1983).

Locality	I Clay particles (<0.01 mm) [%]	II Silt particles (0.01-0.05 mm) [%]	III Fine sand (0.05-0.1 mm) [%]	IV Sand (0.11-2.00 mm) [%]	Density of drainage network [km.km^{-2}]	Slope gradient [degrees]	Bedrock type
The Smrk Mt., southern hillside (900 m a.s.l.)	41.40	22.40	15.56	20.64	1.55	18°29´	sandstones and shales
The Lysá hora Mt., southern hillside (800 m a.s.l.)	23.68	45.76	18.40	12.16	1.14	22°04'	sandstones and shales
The Smradlavá Brook, the Smutné údolí valley (685 m a.s.l.)	47.95	14.96	8.20	28.92	1.69	14°15'	sediments of the Istebná Formation
The Velký potok brook, the slope near the Kyčerská reservoir	28.52	18.60	19.40	33.48	0.89	18°53'	shales and sandstones
The slope of the Visalaje Mt., above the Jezonský potok brook (760 m a.s.l.)	51.68	27.84	10.95	9.56	3.88	12°12'	Shales
The spring area of the Velký potok brook	59.88	24.16	21.76	13.96	2.35	16°26'	weathered sandstones and shales
The Červík Brook, southern part of the Klubovec Mt. (600 m a.s.l.)	22.88	13.76	6.80	56.56	3.17	14°02'	weathered agglomerates of the Istebna Formation
The Lučovec Brook, the base of the slope	40.52	20.32	12.40	26.76	2.79	11°27'	weathered sandstones, agglomerates and shales
The divide range of the Bílá and Bečva brooks	47.44	22.64	8.92	21.00	1.64	10°51'	weathered sandstones and shales
The Salajka gamekeeper's house	63.56	18.96	11.32	6.16	2.63	10°28´	agglomerates and shales
The Maxova nádrž reservoir	51.24	39.88	8.72	0.16	0	0	fine-grained sediments of the Istebná Formation
Average value	39.35	28.28	17.74	14.63	1.90	19,50	shales and weathered sandstones

Tab. 3: The character of Flysch bedrock and its effect on selected morphometric parameters in the Upper Ostravice River watershed.

In mountainous regions, naturally, soil erosion is more intensive due to higher precipitation and snow cover, which supply enough water into the numerous springs and streams. With higher slope gradients the kinetic energy of running water is very high, especially where the soil is frozen or not covered by vegetation (in the early spring or late autumn). Water erosion caused by natural factors can be much pronounced, mainly in the areas of major landslides or deforested slopes. Nevertheless, such occurrence is usually limited both in location and time.

However, the natural erosion can be enhanced by human activities, namely by the processes of clear felling of trees or by constructing dense networks of forest roads. Their surface is damaged and grooved by heavy tractors dragging trees, which speeds up the transport of sediments and soil down the slope (see Mráček, Krečmer, 1975). The impact of timber production on surface runoff and the intensity of water erosion in the Moravskoslezské Beskydy Mts. was also studied by Zelený (1976). On the basis of a long-term observation, he concluded that the construction of new forest roads accelerated the intensity of soil erosion. According to his two model drainage basins in the Moravskoslezské Beskydy Mts., namely those of the Červík and Malá Ráztoka Brooks, the rate of water erosion increased by 300% since the network of dragging roads has been built.

In the second half of the 20th century, the use of heavy machines and tractors in logging and timber transport meant a breaking point towards greater degradation of the forest soil. The slopes were being deforested and a dense network of drag-roads was built for this purpose. The problem is, however, that the surface runoff concentrates in the grooves made by heavy logs and tractors, what's more, due to very low infiltration the water continues running through them long after the rainfall had stopped. This, of course, increases

the amount of sediment transported on the slope. For instance, the Červík Brook mentioned above empties directly into the Šance Water Dam. In August 1979, following high local rainfall (28 mm in 24 hours), one of the eroded dragging roads was run through by water with 2.0195 $g.l^{-1}$ of suspended load in the sample. This concentration was four times higher than in the Červík Brook itself, into which the road emptied. The unpaved dragging roads are therefore a significant source of sediments, which must be considered especially in drainage basins above water dams (e.g. the Šance Water Dam), as the sedimentation of the suspended load may have serious (and costly) consequences.

The forest management in the vicinity of water-supply reservoirs involves not only forest tending but also ensuring the quality of forest road network, as well as the stability of eroded streams and gullies. For instance, the study of the Upper Ostravice River watershed by the ÚHÚL Institute claims that 6.2% of all forest roads is completely damaged by erosion, 36.5% is damaged seriously and 38.1% slightly (Buzek, 2001b; ÚHÚL, 1975, 1991). It can be concluded, that 83% of the road network (in other words, 342 km of roads or 0.66% of the whole Upper Ostravice River watershed area) is a potential source of sediment.

The ground skidding of trees on the unpaved and damaged forest roads is one of the significant factors determining soil erosion. Its negative impacts can be observed especially at places where the roads are situated nearby streams and rivers. To lower the rate of forest soil degradation, the following conditions should be respected:

1. In the relief formed mainly by claystones and shales, the skyline skidding method should be preferred to the use of tractors in ground yarding.
2. In areas with higher rate of soil erosion, the ground skidding should never occur during heavy rainfall events. In contrary, the logs should only be manipulated with in dry terrain.
3. For scattered logging the horses should be used instead of machines.
4. The roadside stacks should not be situated close to any streams or rivers.
5. The maintenance of the forest road network should be carried out during the working process, including the technical and biological sanitation of the terrain.
6. After finishing the work, the damage on the forest road network must be repaired.

It has already been mentioned that it is the low quality forest roads used for ground skidding that represent a significant source of sediments. In 1976-2000, the impact of the use of heavy machines for logging was studied in the Moravskoslezské Beskydy Mts by the author. It is clear from the observations that the small unpaved roads can be the source of as much as 50% of the suspended, insoluble sediment load later transported in streams (Buzek, 1976).

The negative impacts of human activity in the mountainous landscape can be seen especially where the claystones and shales prevail in the bedrock. In the Upper Ostravice River watershed, where the shales are dominant, the natural and antropogenic factors combine and result in higher rate of water erosion in the area.

The rill erosion (both on arable and forest soil) occurs in the upper part of the soil profile and stops only when it reaches the bedrock. If the forest soil is subjected to long-term water erosion, its degradation proceeds rapidly, with the loss of fertility (humus and nutrients) and changes in the genetic horizons involved. According to Midriak (1977), 5-10% of the forest soil area in the Czech Republic is severely affected by erosion and as much as 50% is potentially endangered. All in all, the processes connected with water erosion are of high importance in the forest management, nevertheless, no suitable classification for estimating the level of forest soil damage has been published so far.

The continuous period of 25 years, in which the author has been doing his observations in the Upper Ostravice River watershed, is representative enough to infer some general trends and conclusions. As for the natural factors, it is mainly the type of bedrock and the amount of precipitation (including snow melt-water) that are important for water erosion, however, these can be considerably affected by human activity (mentioned by Megahan already in 1972). For instance, if the logging and ground skidding occurs after rainfall on wet forest soil and drag-roads, the intensity of soil erosion and sediment transport down the slope is enormous. The results of the long-term research show that with precipitation under 10 mm in 24 hours the use of tractors and heavy machines in timber production was hardly limited in the area studied, despite the increasing rate of erosion and enormous sediment discharge into the streams. With the rainfall exceeding the amount mentioned the use of machinery was low, yet it did occur provided that the surface of the roads made work possible.

The data related to the suspended load regime in the Upper Ostravice River watershed are listed in Tab. 4. Rainfall above 10 mm in 24 hours and rapid snow thawing were recorded and the water samples taken at the Staré Hamry gaging station (precipitation data was provided by the Bílá pod Konečnou rain-gage station). From 1976 to 2000, the rainfall events exceeding 10 mm in one day occurred in 941 days, all in the period between 1978-1998 (Tab. 4). In other years, neither precipitation over 10 mm per day nor significant forest work (affecting

the sediment unit-yield) occurred in the Upper Ostravice River Watershed.

The proportion of the suspended load runoff during the days with forest work and high rainfall (over 10 mm in 24 hours) and the annual suspended load runoff reaches as much as 64-99% in the period studied. In other words, it is obvious that high rainfall and human activity are among the key factors increasing the rate of water erosion.

Year a – The annual rainfall [mm] b – The annual runoff [m^3]	The annual suspended load runoff [t]	The suspended load runoff during the days with forest work and high rainfall (over 10 mm per day) [t]	The annual suspended load unit-yield [$t.km^{-2}$]	The average suspended load concentration during the days with high rainfall and forest work [$g.l^{-1}$]	The proportion of the suspended load run-off during the days with high rainfall and forest work and the annual suspend-ed load runoff [%]	The number of days in which the forest work was detected to affect the suspended load runoff (always during high rainfall events)
1978 a) 1 046.0 b) 56.72	4,679	3,961	64.1	0.2399	84	132
1979 a) 1177.3 b) 49.60	3,648	2,341	50.0	0.4318	64	131
1981 a) 54.74 b) 54.74	15,190	14,458	198.2	0.1566	95	78
1984 a) 915.1 b) 40.82	4,361	3,925	59.8	0.3846	90	40
1985 a) 1192,0 b) 58.17	12,388	11,722	169.1	0.4144	95	55
1987 a) 1189.6 b) 55.50	9,644	8,569	117.4	0.2451	89	36
1989 a) 981.6 b) 48.68	2,274	1,780	31.2	0.2420	78	28
1992 a) 784.4 b) 44.77	11,006	9,188	150.8	0.6853	83	37
1995 a) 1187 b) 62.87	6,039	4,480	82.8	0.3514	74	44
1996 a) 1 149.7 b) 62.87	74,102	73,237	1,015.6	0.5361	99	37
1997 a) 1091.7 b) 6.53	252,293	237,502	3,558.0	1.0080	94	71
1998 a) 957.4 b) 47.06	3,995	2,875	54.8	0.3182	72	68
Total	**405,365**	**388,198**	**5,555.8**	**-**	**96**	**783**

Tab. 4: The annual suspended load unit-yield from the Upper Ostravice River watershed in the period from 1978 to 1998. The days with precipitation exceeding 10 mm in 24 hours are listed, as well as the number of days in which the use of heavy machines was recorded to be affecting the sediment unit-yield in streams. (In some years, the effect of forest work on the suspended load unit-yield was not observed, these years are therefore not listed).

The suspended load concentration in the Upper Ostravice River was measured by the Hydrometeorological Institute in Ostrava, too, between 1985 and 1997. However, the methodology used by the Institute was different from the one applied by the author at Ostrava University (see above). The two sets of results are listed and compared in Tab. 5.

The variance of the two sets of results reaches 73.8% in average (for the period between 1985-1997). The

comparison of the values measured shows that at very low concentrations (below 10 mg.l^{-1}) the differences between the two Institutes´ results are less pronounced than at high concentrations above 100 mg.l^{-1} (especially in year 1997). This difference can be explained by the methodology used, namely the intervals at which the samples were taken. Apparently, the results obtained from the measurements taken at daily intervals only (i.e. the CHMU Institute method) do not reflect the suspended load regime reliably.

Year	The suspended load concentration (Ostrava University) [mg.l^{-1}]	The suspended load concentration (the Hydrometeorological Institute in Ostrava) [mg.l^{-1}]	The difference of the two sets of results (see column two and three) [mg]	The variance of the ČHMÚ and OU results [%]
1985	**43.9**	35.2	8.7	19.8
1986	23.0	**27.9**	4.9	121.3
1987	**49.5**	15.1	34.4	69.5
1988	30.2	**38.6**	8.4	127.8
1989	18.7	**21.9**	3.2	117.1
1990	13.7	**14.8**	1.0	108.0
1991	13.5	**89.6**	76.1	35.5
1992	**100.3**	64.8	35.5	35.4
1993	**105.7**	51.0	54.7	51.2
1994	**53.2**	16.0	37.2	70.0
1995	**62.1**	21.9	39.3	74.3
1997	**313.5**	158.2	155.8	49.6

Tab. 5: The suspended load concentration measured by Ostrava University (1976 – 2000) and the Hydrometeorological Institute in Ostrava (1985-1997), respectively, at the hydrometric profile at the Staré Hamry gaging station (for the methodology used see the Introduction).

During the fieldwork, sets of values *[x,y]* were obtained, where *x* is the annual runoff (m^3) and *y* the annual suspended load runoff *(t)*. The correlation coefficient of these values ranges from 0.56 to 0.81, depending on the year[4]. Several regression models were applied (see Tvrdík, Liška, 1991 for details), out of which the following proved to be the most suitable:

$$y = c \,.\, b^x \,[1],$$

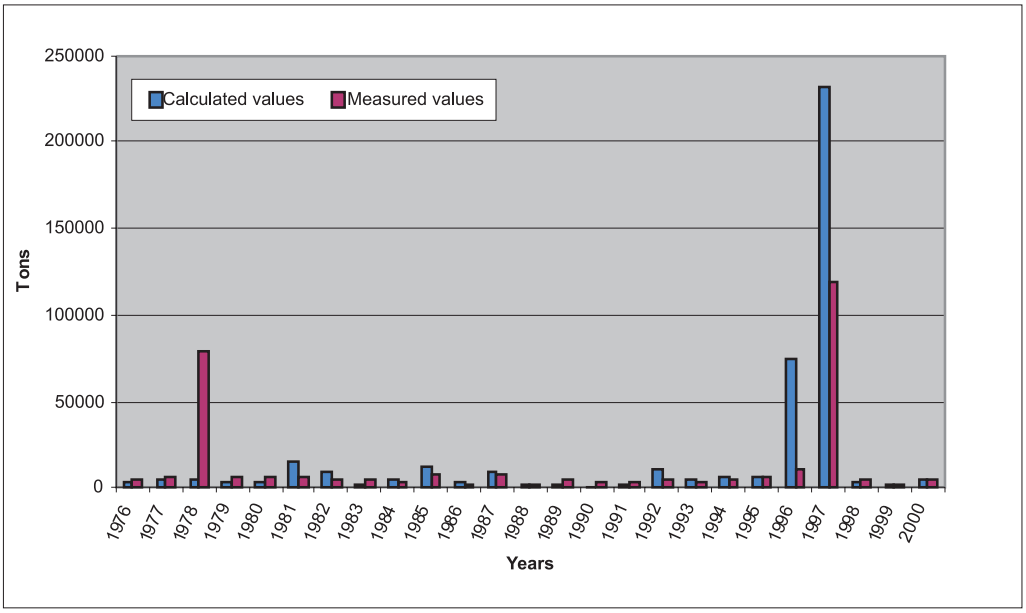

Fig. 2: The suspended load runoff, the Upper Ostravice River (above the Šance Water Dam), 1976 – 2000.

[4] If r = 1, the two data sets are directly proportional. If r = -1, the data sets are indirectly proportional. If r = 0, the data are not proportional. The closer the correlation coefficient to either 1 or –1, the closer the two data sets, too. See Kovačka – Kontišeková (1962) for details.

Year	The measured value of the annual suspended load runoff [t]	The calculated value of the annual suspended load runoff [t] (see equation [1] above)	The difference of the calculated and measured values, annual suspended load runoff [t]	The variance of the measured and the calculated value [%]	Water runoff; the Upper Ostravice River at Staré Hamry gaging station profile [m³]
1976	3,748	4,450	702	84	45.53
1977	5,677	6,178	501	92	51.68
1978	4,679	7,862	3,183	60	56.72
1979	3,648	6,178	1,906	59	49.60
1980	3,186	6,544	3,358	49	52.84
1981	15,190	7,170	8,020	47	54.74
1982	9,183	5,277	3,906	57	48.63
1983	2,620	4,885	2,265	54	47.20
1984	4,361	3,354	1,007	77	40.82
1985	12,388	8,383	4,005	68	58.17
1986	2,972	1,705	1,267	57	31.44
1987	9,644	7,431	2,213	77	55.50
1988	2,570	2,763	193	93	37.88
1989	2,274	5,291	3,017	43	48.68
1990	1,049	3,835	2,786	27	42.99
1991	2,137	2,997	860	71	39.10
1992	11,006	4,260	6,746	39	44.77
1993	4,505	2,797	753	62	38.06
1994	5,746	4,409	1,337	77	45.37
1995	6,039	5,912	127	98	50.81
1996	74,102	10,242	10,136	14	62.82
1997	232,293	118,838	113,455	51	66.53
1998	3,995	4,847	852	82	47.06
1999	2,608	2,576	32	99	36.87
2000	4,713	5,701	988	83	50.10

Tab. 6: The measured and calculated values of the annual suspended load runoff in the Upper Ostravice River Watershed between 1976-2000.

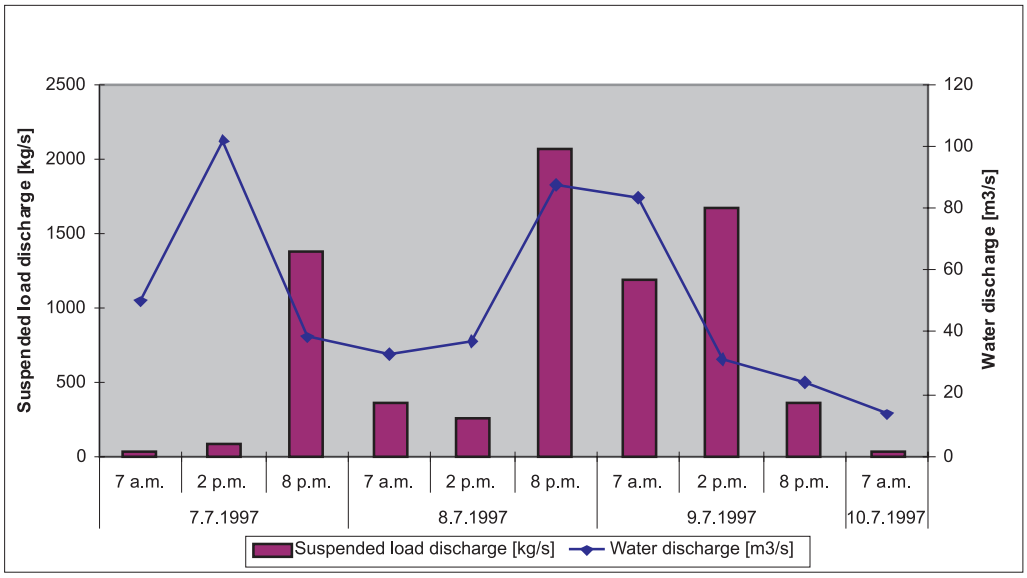

Fig. 3: The relation between the suspended load discharge and water discharge, the Upper Ostravice River between 7-10th July, 1997.

where c and b are coefficients and equal 2.59 and 2.256, respectively. The comparison of both the measured and calculated values is illustrated in Fig. 2 and Tab. 6.

The long-term research (1976 – 2000) of the suspended load regime in the central part of the Moravskoslezské Beskydy Mts. examined a range of meteorological and hydrological situations. By their comparison it was found out that, for the same period, it is possible to correlate the river runoff in 24 hours (x, in *mil.* m^3) with the suspended load runoff (y, in *tons*) according to the following equation (see Tvrdík, Liška, 1991 for details):

$$y = 221.84^{1.2881.x}\ [2].$$

For the suspended load concentration in 24 hours exceeding 2 $g.l^{-1}$, the correlation coefficient (r) reaches 0.85 for the set of values *[x,y]* in this equation. However, the higher the water runoff from the watershed, the higher the difference between the measured and calculated values, too (Buzek, 2004). Tab. 7 below shows an overview of the particular days (23 in total) in which the suspended load concentration exceeded 2 $g.l^{-1}$ – all together, these days amount to as much as 69 % of the total suspended load runoff in the period between 1976-2000. Moreover, the effects of the intensive long-term precipitation or rapid snow thawing, which cause the mechanical destruction of the soil, were enhanced by the use of heavy machines and unwise technological processes in the forest work. The local storms usually only affect the intensity of the suspended load regime locally and temporarily.

Date	The average daily suspended load concentration [$g.l^{-1}$]	The suspended load runoff [t]	The suspended load unit-yield [$t.km^{-2}$]	The amount of rainfall [mm]	Average daily water discharge [$m^3.s^{-1}$]	Percentage proportion on the suspended load runoff in the particular month [%]
3.8.1978	4.6737	678	9.3	28.0	1.68	0.15
22.2.1979	3.2433	227	3.1	41.0	0.8	0.05
11.3.1981	2.2488	5,406	74.1	33.4	27.70	1.20
7.8.1984	8.1002	1,715	23.5	thawing	2.45	0.38
15.5.1985	5.3770	2,676	36.7	56.3	5.76	0.59
5.4.1987	2.1080	1,834	25.1	13.7	4.87	0.41
19.5.1987	3.3577	887	12.2	24.8	0.40	0.20
10.7.1989	3.7577	130	1.8	13.3	8.30	0.03
28.3.1992	3.9225	2,815	38.6	59.2	1.10	0.62
6.6.1992	2.4090	213	2.9	13.0	4.19	0.05
7.1.1994	2.0783	756	10.4	thawing	5.01	0.17
6.6.1994	2.6356	1,148	15.7	13.0	7.12	0.25
15.7.1995	2.2843	1,467	20.1	19.0	2.26	0.33
11.6.1996	15.4831	3,024	41.4	30.6	2.26	0.67
12.6.1996	3.6420	628	8.6	73.5	2.00	0.14
7.9.1996	7.1103	18,676	256.0	16.6	30.40	4.14
8.9.1996	8.1627	33,629	458.2	50.4	47.40	7.46
9.9.1996	3.5848	6,876	94.2	92.3	22.20	1.53
17.5.1997	3.1624	648	8.9	24.4	2.35	0.14
18.5.1997	7.0290	1,488	20.4	10.3	45.2	0.33
7.7.1997	18.3961	90,597	1241.7	17.2	57.0	20.10
8.7.1997	16.2375	67,340	923	18.5	48.0	14.94
9.7.1997	14.7553	68,205	934.8	45.2	53.50	15.13
8.6.1998	8.5522	159	2.2	47.4	2.51	0.04
Average	**6.3062**	**-**	**178**	**32.7**	**14.39**	**2.88**
Total	**-**	**311,022**	**-**	**-**	**-**	**69.00**

Tab. 7: The suspended load concentration (over 2 $g.l^{-1}$) and other characteristics of the suspended load regime in the Upper Ostravice River watershed between 1976 – 2000 (see equation [2] above).

Conclusion

Water erosion of the forest soil, whose intensity and regime were studied on the Upper Ostravice River model watershed (above the Šance Water Dam), is determined both by natural factors (esp. precipitation, bedrock type or vegetation cover) and by human activity, namely the use of heavy machines and tractors in timber production. There are several methods of assessing the intensity of erosion; the one applied by the author involves studying the characteristics of the suspended load regime or, more specifically, the suspended load unit-yield for the model area. According to these two characteristics, the Upper Ostravice River watershed represents areas with mostly medium to very high intensity of erosion (see Tab. 2). The localities with high erosion rate are typically formed by shales in the bedrock, with the density of valley network usually exceeding 2, often even 3 $km.km^{-2}$.

Most insoluble particles are transported into streams in the form of suspended load or sediment following high rainfall events (more than 10 mm in 24 hours). Often, this process is intensified by the use of heavy machines and trucks in timber production and logging. In the period studied, such influence was observed namely in years 1978, 1979, 1981, 1984, 1985, 1987, 1989, 1992, 1995, 1996, 1997, 1998. The days (23 in total) in which the suspended load concentration exceeded 2 $g.l^{-1}$ amount to as much as 69% of the total suspended load runoff measured between 1976-2000.

There were two different institutions carrying out the research of suspended load regime in the period from 1985 to 1997, namely Ostrava University (OU) and the Hydrometeorological Institute in Ostrava (ČHMÚ). The methodology applied by each of them had a significant influence on the results obtained. The latter Institute (ČHMÚ) took their samples in daily intervals only (at 7 a.m.), which was proved to be insufficient for expressing the total suspended load runoff in 24 hours. All in all, the two sets of results differed by 74% (see Tab. 5).

The process of suspended load sampling and evaluation is quite costly, therefore, based on the long-term research, the author applied statistical methods to correlate the suspended load and hydrological regimes for the model watershed. As a result, there are two equations: firstly, $y = c.bx$ [1], where c and b are coefficients, x the water runoff (in mil. m^3) and y the suspended load runoff calculated (in tons). Secondly, for suspended load concentrations exceeding 2 $g.l^{-1}$, equation $y = 221.84^{1.2881x}$ [2] can be used (for details see above).

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LANDSCAPE CHARACTER ASSESSMENT (CASE STUDY OF THE HUSTOPEČE CADASTRAL AREA, SOUTH MORAVIA, CZECH REPUBLIC)

Markéta FLEKALOVÁ, Pavel TRNKA

Abstract

Landscape character preservation has become integral part of nature and landscape protection. Methods of preventive landscape character assessment have been proved on the Hustopeče cadastral area which has been divided into three characteristic units, based on interpretation of land use, topography, scale and spatial and visual relations. Attributes of landscape character have been identified in each unit and their significance, appearance and value have been determined. Hustopeče is localized in diversified landscape, each unit representing a different type of cultural landscape.

Shrnutí

Hodnocení krajinného rázu (Případová studie katastrálního území Hustopeče, jižní Morava, Česká republika)

Ochrana krajinného rázu se postupně stala nedílnou složkou ochrany přírody a krajiny. Metody preventivního hodnocení krajinného rázu byly ověřeny na katastrálním území Hustopeče, které bylo na základě vyhodnocení aktuálního využívání krajiny (land use), geomorfologie území, měřítka, prostorových a pohledových vztahů rozděleno do tří charakteristických celků. V jednotlivých celcích byly identifikovány znaky krajinného rázu a stanoven jejich význam, projev a cennost. Hustopeče leží v diverzifikované krajině, každý celek představuje jiný typ kulturní krajiny.

Key words: *land use, visual relations, landscape attributes, microregion Hustopeče, Czech Republic*

1. Introduction

The issue of landscape character assessment and protection has been nowadays gaining interest in landscape management. Landscape character is an important value of the extant natural and cultural environment and is therefore protected against degradation. According to Vorel et al. (2006) it is given by specific features and attributes which constitute its character – difference and uniqueness. It represents not only the presence of positive features and attributes but also the cultural and spiritual dimension of the landscape.

Landscape character is one of inseparable attributes of any landscape – it is first of all its specific appearance conditioned by the certain internal structure of landscape constituents and elements which are both natural and anthropogenically changed or even man-made. Their pattern in numberless combinations results in a landscape picture which is then perceived by human senses and judged, evoking in people feelings of pleasure, peace, beauty or (in the worse case) entirely opposite feelings. Often it is not only the aesthetic quality of landscape scenery what is concerned, but also its spiritual value (genius loci), putting local people together by means of mental connection with the concrete space and time, which makes it specific or even unique.

At the same time, the landscape character mirrors the landscape's historic development and a part of the cultural identity of its inhabitants. If the emotional relations to landscape and earth are torn, what happened in Czech lands during the time of rural socialization and forced agriculture collectivization, the rectification of injuries to landscape and people's minds is difficult and taking a long time. In that period, many typical and specific features of the landscape character of individual regions were irreversibly lost and the regions' landscapes became visibly uniform. Return to their original appearance is hardly possible, but at least the continuing unification of our landscape can be prevented under the pressure of current globalization trends and characteristic features of landscape character – identification marks of the Czech and Moravian rural landscape can be preserved or restored.

Important is the fact that landscape character protection got the legislation support in the environmental Act No. 114/1992 Coll. whose § 12 defines the "landscape character as natural, cultural and historic characteristics of a particular place or area" and protects it "from all actions deteriorating its aesthetic and natural value". Preservation of landscape character and identity is doubtlessly a necessary and integral part of the modern concept of nature and landscape protection in advanced society and it is common in most EU countries. This law stipulates an obligation for nature protective authorities to protect landscape character from degradation of its natural and aesthetic merits, from decreasing the value of cultural dominants, harmonic scale and harmonic spatial relations in the landscape.

But how to express the landscape's aesthetic and natural values, how to objectify subjective views of assessors? The decision-making praxis (or more precisely its clerks) was in this problem for a long time almost puzzled and therefore needed a unified procedure of landscape character assessment.

The need for expression and definition of elements, which built up landscape character, for detection of their mutual relations and merits led to the development of a universal methodology. This is how the first (but not the only one) complex method and later methodology of landscape character assessment came to existence (Bukáček, Matějka, 1997).

The innovated method according to Bukáček (2006) consists in the identification of landscape character attributes within a defined area, in their classification (significance, manifestation, singularity), in the analysis of mutual relations to aesthetical value of landscape character and harmonic scale of the landscape, formulation of a proposal for the protection of positive values of landscape character and suggestion for the elimination of negative values.

The method is used in two types of landscape character assessment:

- Causal, when impact of concrete intention is assessed
- Preventive, when the landscape character of particular area is assessed for the purpose of protection from potential disturbance.

While the state administration clerks are usually supposed to express their opinion about the impact of concrete project e.g. structure on landscape character, this paper deals with the preventive landscape character assessment at microregional level on a chosen model area (cadastral area Hustopeče near Brno, South Moravia) and considers its significance for strengthening the region's identity.

2. Methods

Preventive assessment of landscape character aims at an evaluation of current aesthetic and natural values of landscape character in the studied area (Bukáček, 2006). The preventive landscape character assessment describes landscape's present qualities, proposing which characteristics should be protected for the preservation of landscape character without planning any concrete project with impact on the landscape character. The preventive assessment makes it possible in the future to effectively and without excessive time consumption evaluate the intervention of a concrete project right in the decision making practice.

Authors of methodologies of landscape character assessment agree in opinion that a basis for landscape character assessment is to set its determinant starting points which are sometimes termed characteristics, attributes or merits. They are further categorized according to particular authors as natural, cultural, spatial, aesthetic, historic and perceptual. Based on these characteristics or attributes, areas and places (units and spaces) of landscape character are then identified and the need for their preservation. From this basic frame comes out the landscape character assessment in the model area. The process was best summarized by Bukáček (2006), who recommends the following four basic steps:

1) Determination and characterization of the area studied, differentiation of its landscape into spatial units;
2) Identification of current landscape character character attributes and values in spatial units, their classification;
3) Finding relations in the landscape with respect to the entire area studied, finding the landscape's scale;
4) Creation of landscape character protection rules in relation to the potential landscape development.

The characteristic landscape units were set out in the process of assessment. Their characteristics and attributes were described and their significance, appearance and value were determined. Within these units particularly valuable places of landscape character were specified where significant and valuable attributes with positive manifestation are concentrated and which are worth preservation.

Groundwork for landscape character assessment in the model area was the study of actual maps, orthophotomaps and thorough field survey. Starting point for landscape division into characteristic units is a detailed assessment of actual land use, geomorphology of the model area, the scale and visual-spatial relations in the landscape and its structure. Significance of land use assessment

for learning the landscape character is pointed out by Swanwick (2002), who considers it to be of the same importance as the influence of geological bedrock, soil, topography, climate and biota. The land use assessment also mirrors the complex of natural, cultural and historic features of the given locality, as it is mentioned in Act No.114/1992 Coll.

The aesthetic value of landscape character is represented by structure and scale of the landscape, by visual linkages, characteristics of view horizons and by identification of disturbing elements. The focus on perceptual and visual values of the landscape appears for example in works by Salašová (2004, 2006), where visual area zoning with emphasis on view horizons and lines sensitive to placement of buildings plays an important part of assessment.

Outputs from the analyses were attributes and characteristics, which are specific and thus different for each unit, eventually their combination differs. Thanks to them the landscape units can be distinguished from one another. Parameters of particular attributes and characteristics for individual characteristic landscape units were evaluated according to Vorel et al. (2006) against the following scales:

Attribute significance for landscape character:
1 – essential; 2 – codetermining; 3 – complementary
Attribute manifestation:
+ positive; 0 neutral; - negative
Attribute weight:
1 – singular; 2 – distinctive; 3 – common

When assessing even the local landscape character it is important not to cut the model area out from the larger landscape context. Inclusion in a wider landscape frame is crucial to understand functioning of the landscape, driving forces that participated and participate in its formation, proper division into units with different landscape character, finding analogies in other landscapes, for a possibility to determine the landscape character singularity and hence for requesting its preservation on higher levels, too – for example on a level of the region or the whole country. Wider spatial relations were established on the basis of maps, literature search, microregion survey on the bike and by means of monitoring flight.

3. Model area

Space chosen for the landscape character assessment was the cadastral area Hustopeče, namely for its high landscape heterogeneity within one cadastre. The model area is situated about 40 km southeast of Brno (Fig. 1) in the North-Pannonian biogeografical subprovince. Suitable climatic conditions and soils good for agriculture allowed early settlement of the region which is one of the earliest settled areas of Moravia (as far back as in the Neolitic times some 6 500 years ago). The resulting condition of the landscape is therefore marked by the long lasting coexistence of landscape and man.

The attached aerial photograph (Fig. 2) depicts the character of landscape around Hustopeče. The photograph was taken from the west and although it primarily pictures the town, different functional types of cultural landscape are evident. In the front, there is an agricultural landscape, characteristic with the large blocks or arable land and large scale buildings (e.g. farmstead premises). Approximately the centre of the photograph is cut by a highway which is a clear barrier behind which the town development doesn't continue. This is further contributed to by terrain – behind the highway, a slope is rising on which extant tiny crofts can be seen – stripes of fields, vineyards and orchards.

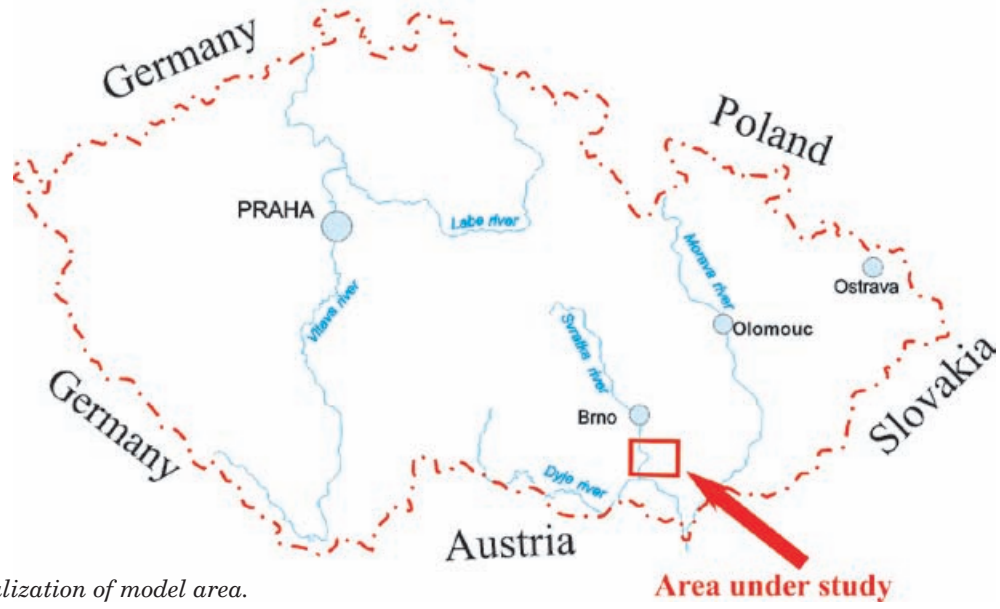

Fig. 1: Localization of model area.

Background of the picture shows apparent forest enclaves. In this space, there are two more types of the cultural landscape – the landscape of vineyards and orchards and the landscape of a forest steppe appearance. Landscape in the northern part of the cadastral area Hustopeče is shown also in Fig. 3 (see cover p. 4) – in the left part of the photograpgh there are stretches of forests, on the right side there are wide terraces with the valley of Štinkovka R. winding between them, whose slopes (similarly as the slopes of the terraces) exhibit succession towards forest-steppe formations. At the background the dominant of the Pavlovské vrchy Hills shows over the edge of Hustopeče town.

Topography plays an important part in landscape use and in its final character (Fig. 4). Particularly in the northern part of the cadastral area the topography shows high energy. The highest point is the spot height of Kamenný vrch Hill - 343 m a.s.l. The lowest point is on the SE edge of the cadastral area, not far from the outflow of Štinkovka R. from the area, 172 m a.s.l. Some parts with smaller elevation differences show extremely tiny segmentation. Fairly wide floodplains and graben-like depressions with planated surfaces often separate isolated, conspicuously protuberant hills and ridges.

Fig. 2: Hustopeče – aerial photograph from the west. (Photo: Miroslav Kamrla, 1999)

In the modern history, the landscape character was shaped mainly by wine growing. In the second half of the 18th century, Hustopeče even became the largest wine-growing village in the whole Moravia with the surface area of vineyards reaching over 50% of arable land. The huge area of vineyards can be seen on the map from the second military mapping (1836-1852) (Fig. 5). Vineyards were located on any slope with favourable aspect, often at places of today's arable land which dominates especially in the southern part of the cadastral area with for it favourable soil and geomorphological conditions. In 1900, there were still 578 ha of vineyards in the cadastral area Hustopeče. However, the next year's epidemic of phylloxera eradicated most of the vineyards and the vacant space in the landscape was taken (besides arable land) by orchards.

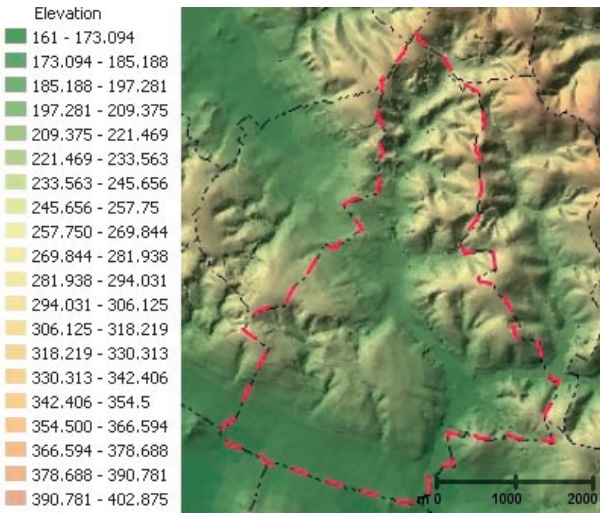

Fig. 4: Topography of the Hustopeče cadastral area. Digital terrain model based on layer 3D Topography of ZABAGED. Source: Agroprojekt, 2002

The biggest curiosity were extensive almond orchards which have partly survived until now and which tempt for a walk when in blossom, dominating slopes above the town. It was in Hustopeče where an almond variety named Zora was newly bred. More details are provided by Kordiovský (2002). The town of Hustopeče strives to maintain and regenerate the almond orchards.

Viticulture in Hustopeče began to flourish again in the 1930s when new schools of viticulture were established and agrarian wine-growing associations came to existence. The period after 1955 witnessed a development

of large-scale plantations in cooperative vineyards but also of small private vineyard plots. At the present time, Hustopeče ranks again with the most popular wine-growing villages. Traditional varieties grown there are Grüner Veltliner, Riesling italico, Neuburger, Grüner Silvaner, White Riesling, Roter Traminer, Sauvignon Blanc, Pinot noir, Blaufränkisch and Portugais Bleu. The culture of wine growing and making plays again an important role in the life of the town.

The present use of the cadastral area the size of which is 2,453.3 ha as recorded by the Czech Statistical Office (data from 2003) is as follows:

arable land	1,395.6 ha
vineyards	233.9 ha
gardens	54.6 ha
fruit orchards	151.1 ha
permanent grasslands	107.1 ha
forests	37.8 ha
water surfaces	10.6 ha
built-up areas	89.8 ha
other surfaces	372.7 ha

The change of landscape structure and scale of its use can be best considered from historic aerial photographs and from their comparison with the present orthophotomap. Clearly apparent is a move from small-scale private land tenure to large-scale blocks of arable land (Fig. 6). The extant crofts have therefore not only aesthetic but also historic value.

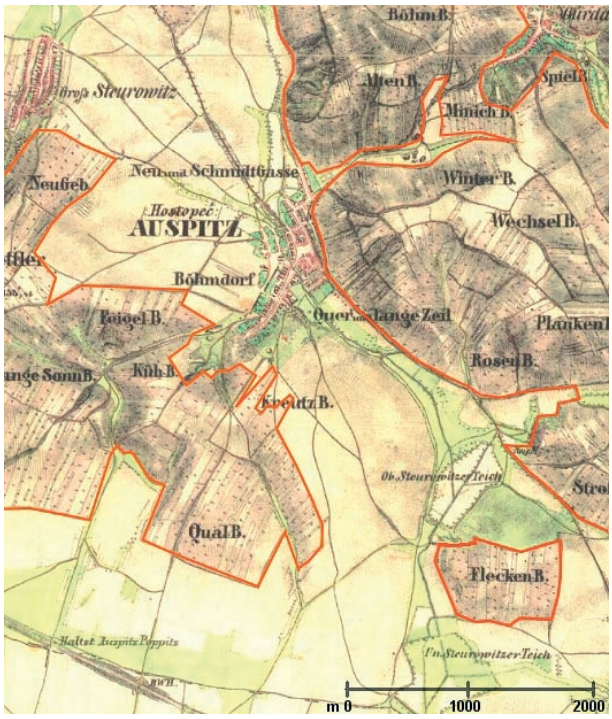

Fig. 5: Localization of vineyards in 19th century. Source: Own compilation on map of 2nd Military Survey, 1836–1852

Autochthonous vegetation has not been preserved and natural substitute vegetation occurs only on spots, nevertheless the abandoned terraces of old orchards and vineyards head to the forest-steppe character thanks to the secondary succession. Potential vegetation would consist mainly of the Pannonian oak-hornbeam woods, frequent would be also the representation of thermophilic oak woods. According to Culek (1995), the whole bioregion of Hustopeče has been continually inhabited from primeval ages with the permanent deforestation of large areas having occurred before the middle ages. Complexes of forest vegetation are isolated, non-continuous, in some parts the arboriceous vegetation is present only in the form of robinia woods. Predominant are extensive agricultural cultures (fields, orchards, vineyards), in the last few decades many slopes were terraced. Natural substitute vegetation has been preserved practically only on steep slopes.

4. Broader spatial relations

The cadastral area of Hustopeče is a representative sample of south Moravian landscape. A similar character features the whole microregion of Hustopeče which is now built of 29 communes and whose natural centre is Hustopeče.

The microregion is geographically situated in the Dolnomoravský úval Graben, on the transition to

Fig. 6: Orthophotoap of model area. Source: Geodis, undated (about 2002). Provided by Hustopeče municipality

southern edge of the Ždánický les Forest. The landscape is distinguished by heterogeneity and segmentation – it is used at 78% for agriculture, 7% are forest areas, 4% water surfaces, 11% built up areas and other spaces.

The microregion is one of areas that were earliest colonized. The current settlement structure formed between the 13th and the 15th centuries. Today, it is inhabited by 36,015 residents on the area of 27,416 ha as inform web sites of the Hustopeče microregion. Character of the area was shaped by the way of living of local population which focused especially on agricultural production, especially on growing wine and fruits. This tradition has been kept until now.

Intensive land use by humans is apparent from extensive deforestation, straightened water courses and dense pattern of roads, paths, and buried services. Villages are localized not far from each other and are usually surrounded by arable land and vineyards. Individual villages in landscape are visible not only as islands of red roofs and greenery around, but the church in their centre often functions as a visual dominant, especially if the village is seated on the hilltop. Lack of dispersed landscape vegetation in some landscape parts intensively used for farming is compensated by tree rows and alleys along the roads. They also protect roads against wind – fulfilling a similar function as windbreakers.

From the viewpoint of the whole country the microregion can boast of singular small refuges of extant thermophilic vegetation, which are reason for the protection of a few small-scale protected areas. Most important localities are: National Nature Reserve Pouzdřanská step Steppe – Kolby, cadastral areas Pouzdřany and Uherčice; Nature Reserve Kamenný vrch Hill, cadastral area Kurdějov; Nature Reserve Nosperk, c.a. Němčičky; Nature Reserve Roviny, c.a. Diváky; Nature Reserve Zázmoníky, c.a. Bořetice; Nature Reserve Hrádek, c.a. Morkůvky; Nature Reserve Velký Kuntínov, c.a. Boleradice.

5. Results

The assessed area was divided into three characteristic units. The division was based on a detailed evaluation of actual land use, geomorphology, scale and visual and spatial relations. Analyses of land use is an important basis for landscape character assessment, because it not only informs about the actual utilization of the landscape, but also enables to identify the landscape's secondary structure, usually closely related to relief. This type of relation was proven in the Hustopeče cadastral area as well. By comparing with the historic maps and pictures the land use helps to determine development of the cultural landscape. Land use was assessed in ten basic categories which were further broken down by scale and by the precise use of the plot or by its function (Fig. 7).

Visual relations, view points, dominants, disturbing elements and visual horizons were also researched in the landscape. A synthesis of these attributes gave three characteristics landscape units (Fig. 8).

Visual horizons in the landscape were divided into main and secondary ones, notably according to how often they project into views when moving across the landscape, how preserved they are, and whether they reflect attributes typical for the Hustopeče microregion landscape. Interventions into main horizons should be made very sensitively.

Most disturbing elements in the model area were established highways (source of noise stress, barrier for the movement of both animals and people) and high voltage power lines (many times repeated same element of pillar, which unifies the landscape, visible from a distance, unnatural straight line). Other disturbing elements are transmitters, especially for their common location on terrain elevations and therefore visual exposure and for their unified character. On the other hand, they can function as an identification element for a particular hilltop and help for orientation in terrain.

Significant places of landscape character were set in the end within the individual units. Their detailed description is beyond the scope of this article, but in general it can be said, that they represent places, where a characteristic feature has been preserved within the unit, places important for landscape identity such as view points and places on the horizon, visible from the surrounding, places representing the landscape memory – both the older ones, featured by chapels, crofts, wild orchards, hedges, forest areas and ponds, and the newer ones such as terraces on slopes, which are on the one hand a technical measure changing the face of the landscape, but which on the other hand facilitate the return of forest- steppe vegetation species on their slopes. One of important places is also the dominant manufacturing and warehousing site near the train station Šakvice, which may however be perceived negatively.

Unit 1 – Southern part of the cadastral area Hustopeče (Fig. 9 – see cover p. 4)

Prevailing land use: Arable land
Scale: Large blocks of arable land, large buildings
Structure: Regular landscape structure, sharp lines of roads, water courses, land division
Topography: Flat land and softly rising southern slopes
Visual relations: Open landscape, with limestone outliers of the Pavlovské vrchy Hills (the Pálava Protected Landscape Area)
Character of visual horizons: Horizon No. 1 is secondary, a part of the intensively utilized landscape, by no means singular; horizon No. 2 is main, reflecting characteristic

LAND USE CATHEGORIES				
	Basic cathegory		Specification	
nr	name	lett	description	color
1	arable land	a	big blocs	
		b	medium rate	
		c	small land tenure	
2	objects out of urban area	a	housing	
		b	train station	
		c	factory	
		d	agronomic areal	
		e	other	
3	areal dispersed vegetation	a	forests	
		b	small woods	
4	linear dispersed landscape vegetation	a	by roads and paths	
		b	by watercourses	
		c	balks and ravines	
		d	windbreakers	
		e	border lines	
5	post-agrarian follow land	a	ruderalised barrens	
		b	forest steppe vegetation	
6	water			
7	vineyards	a	big blocs	
		b	medium rate	
		c	on wide terraces	
8	crofts (private, small, mixture of use)			
9	orchards	a	intensive	
		b	extensive	
10	permanent grasslands			

Fig. 7: Land use in the Hustopeče cadastral area. Source: Own compilation on orthophotomap

land use from the historical point of view, small-scale private plots; horizon No. 11 - secondary, visible especially when viewed from the landscape unit of Štinkovka R. valley, and built up by a row of poplars – this is a horizon of agrarian landscape, its importance is surmounted by the panorama of Pavlovské vrchy Hills appearing behind it, possible measures into the horizon character must not wipe off the singularity of this view.

Disturbing elements: Silo, manufacturing and warehousing site, negative dominant in the landscape.

Specification of landscape character attributes	Significance	Appearance	Value
Big blocks of arable land	1	-	3
Geometrization of landscape	2	-	3
Flat land	2	0	3
Visual connection with Pavlovské vrchy	2	+	2
Vertical buildings with technical character	3	-	3
Sequence on historical land use	3	+	1

Tab. 1: Characteristics of Unit 1 – south part of the Hustopeče cadastral area.

Character of the southern part of the cadastral area Hustopeče is first of all given by intensive agricultural production. This attribute however carries mostly negative denotations, namely no respect of human scale. Valuable and of positive appearance are remainders of historical land use (small private plots - crofts) (Fig. 10 – see cover p. 3) and the visual connection with the Pavlovské vrchy Hills. Regarding the small area of extant crofts, their significance for the landscape character of the whole unit is only supplementary. Negative in appearance are huge buildings of technical character, which dominate in the panoramic landscape. On the other hand it must be admitted, that -with no consideration of the negative visual display- they identify the landscape and contribute to better orientation.

Unit 2 – Hustopečská brána Gate
(Fig. 11 – see cover p. 4)

Dominant land use: Even shares of arable land, intensively used orchards and vineyards
Scale: Stretches of mid-sized plots
Structure: Landscape structure is articulated, base lines of roads and ravines or terrain depressions (visualized

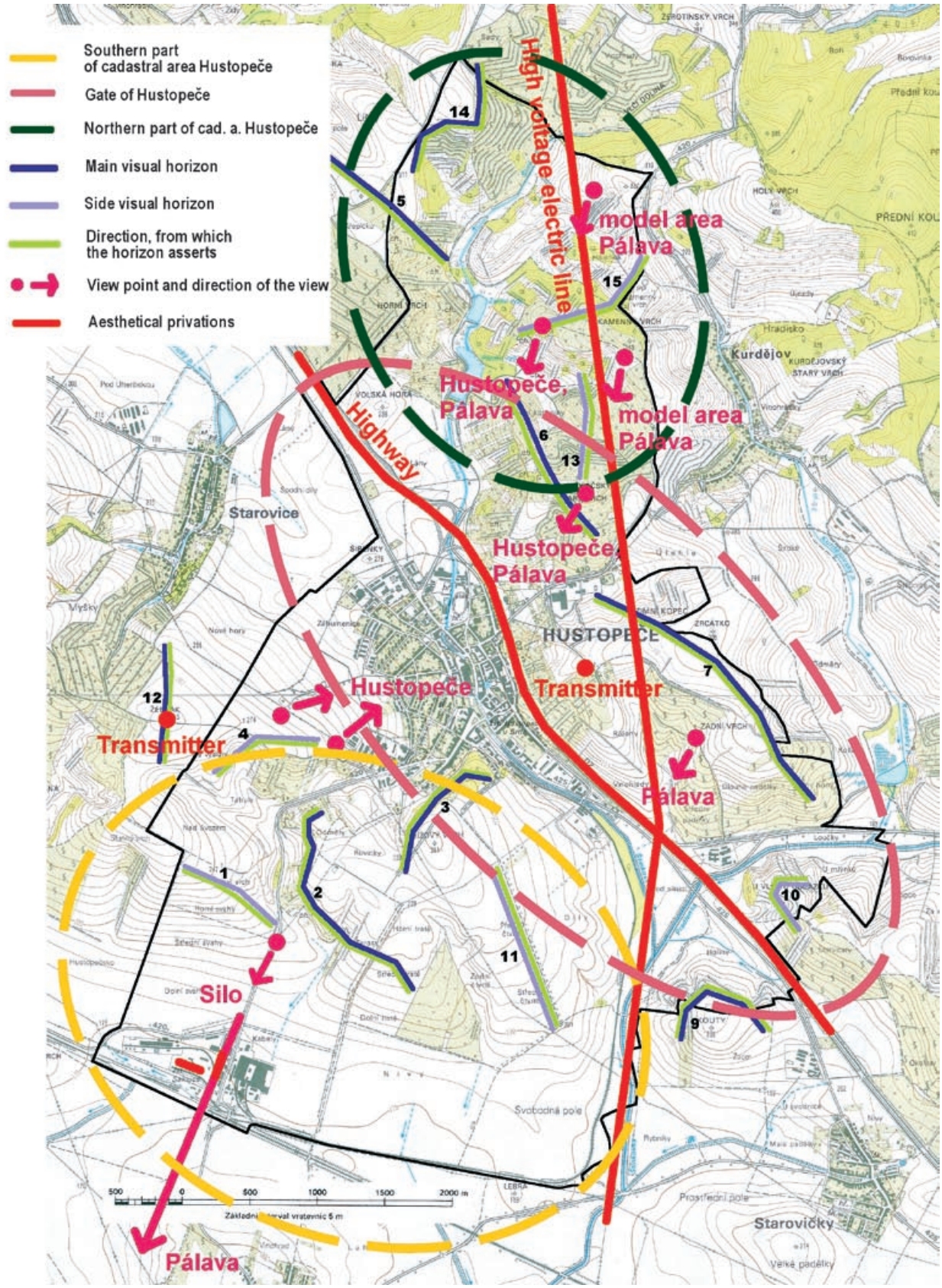

Fig. 8: Characteristic landscape units and visual relations in the Hustopeče cadastral area.
Source: Own compilation based on Base Map of CR 1:25,000

with vegetation) are undulating with the boundaries of plots among them running straight
Topography: Flat valley from which slightly undulated slopes are rising, higher in NE than in SW, a part of the valley is occupied by the town of Hustopeče
Visual relations: The unit is visually closed, with only hilltops on the periphery offering views of the town, of the Pavlovské vrchy Hills and further on into the landscape
Visual horizons character: Horizon No. 3 is the main one, leads across the Křížový vrch Hill, being forested and visually demarcating the town; horizon No. 4 is secondary, illustrates small crofts, being however somewhat inexpressive; horizons Nos. 5, 6, 7 and 8 are the main ones, projecting behind the town and framing it, include the characteristic extant crofts (horizon No. 8 lies outside the model area being demarcated by the Liščí vrch Hill and the Žerotínský vrch Hill south of Nikolčice; horizon No. 9 is the main one, creates a dominant in the flat landscape, determinates edge of the valley, characteristic wild orchards appear on it; horizon No. 10, secondary, interesting with a big amount of greenery, still it is visible from only a few places – highway or the Zadní vrch Hill; horizon No. 12, main, visually encloses the landscape unit, it is characteristic by a transmitter on the Žebrák Hill
Disturbing elements: The dominant effect has above all the highway, visually, acoustically and by feeling the barrier, then the hard line of high voltage power line cutting across the valley.

Specification of landscape character attributes	Significance	Appearance	Value
Balance of arable land, vineyards and orchards	1	0	2
Sequence on historical land use	1	+	1
Winding lines in landscape	2	+	2
Flat valley, rising slopes	2	0	2
Visual closeness of the unit	3	0	2
Views from the hilltops	3	+	2
Dominant highway (noise, dust, barrier)	1	-	3
High voltage power lines	2	-	3

Tab. 2: Characteristics of Unit 2 – the Hustopečská brána Gate.

Character of the unit is given by the balance of arable land with vineyards and orchards. Long tradition shows of mainly wine and fruit growing which has been developed here in the form of intensive production. A significant part of the valley is occupied by the town which still keeps its enclosed character linked to its historical development, but sprawl of warehousing and manufacturing sites already occurs along the speedway. The speedway has an adverse impact in the territory and, moreover, it represents a feature of essential significance, the impact of noise and waste products from traffic is increasing. On the contrary, a singular and essential attribute with positive effect is the linkage to historically given agrarian land use.

Unit 3 - Northern part of the cadastral area Hustopeče (Fig. 12)

Dominant land use: varied use, represented are also woods and game refuges, fallow lands, forest-steppe vegetation on slopes, terraces and in wild orchards, minor share of arable land
Scale: Small-sized plots of land
Structure: Undulating lines in the landscape come up mostly from the rugged topography
Topography: Dynamic, segmented hilly country, anthropogenic terrace forms
Visual relations: Small valleys in the segmented hilly country are visually enclosed, nearly the entire cadastral area can be viewed from elevations, the views are also entered by the Pavlovské vrchy Hills, individual ridges and forest complexes which are uncommon in other parts of the cadastral area function as dominants
Visual horizons character: Horizon No. 13, secondary, finds itself out of the main peoples' movement in the landscape, overgrown by orchards, both managed and wild running, partly devaluated by high voltage power lines; horizon No. 14, main, although not being visually exposed from the town, the major modification of the sloping landscape into the form of wide terraces is one of dominant features within the territorial unit; horizon No. 15, secondary, important by the fact that it is forested, but out of the main peoples' movement in the landscape, devaluated by high voltage power lines
Disturbing elements: An unnaturally hard line and technical character are brought into the landscape by the high voltage power line which stands out even more in the forest aisle, negative role is also played by transmitters on the surrounding hills (outside the model area).
The high (supraregional) ecological value of this landscape part with a high share of near-natural steppe, shrubby and forest associations on slopes and shallow soils is evident as well as the above-average cultural value of the broken terrain with orchards, vineyards and gardens. Essential positive and singular feature is the linkage to historical land use – both the extant orchards of thermophilic fruits, namely almond trees (Fig. 13 – see cover p. 3), and the small crofts. The small land pieces requiring a lot of manual work are indeed jeopardized in their very existence. In terms of valuables a singular feature are also the forest complexes but only at a microregional level, which are otherwise missing in the entire cadastral area.

Specification of landscape character attributes	Significance	Appearance	Value
Sequence on historical land use	1	+	1
Rugged topography	1	+	2
Small scale	2	+	1
Content of visually closed spaces	2	+	2
Views from particular hilltops	2	+	2
Forest complexes, water planes	2	+	1
High voltage power lines	2	-	3

Tab. 3: Characteristics of Unit 3 – Northern part of the Hustopeče cadastral area.

Fig. 12: High voltage power lines and forest aisle in Unit 3. (Photo: Markéta Flekalová)

According to the project Recultivation of the Hustopeče microregion landscape (Agroprojekt, 2002) the territorial unit represents a type of the field and fruit/wine growing landscape which is determining for the Pannonian zone of South Moravia and singular in the territory of the Czech Republic. Apart from the conversion to arable land in large blocks, inappropriate and disturbing intervention into the landscape character is also the construction of broad agrarian terraces. Consolidated extensive stretches of arable land are threatened by water and wind erosion. Another negative phenomenon is desolation of both old and newer orchards. Aesthetic and landscaping values consist primarily in the good condition of small structural elements and a colourful mosaic of field crops.

6. Discussion

According to the differentiation of landscape character types by Löw et al. (2006), the Hustopeče region ranks with Type 2M1 – Old residential Pannonian landscapes, Forest-agrarian landscapes, Landscapes of Pannonian common plateaus and uplands. With respect to a wider landscape context on the regional scale it can be stated according to this typology that it is a common landscape type within the Pannonian with differences in the landscape character being significant on microregional and local scale.

The evaluation mentioned above considers the national scale, being typological and therefore looking for congruent elements among landscapes. The evaluation introduced in this paper is individual, looking for and preferring differences on a microregional scale, though arriving at a conclusion that the importance of preserved typical crofts and orchards of warmth-loving fruit trees (mainly almond trees) in the model area is reaching beyond the regional boundaries, namely with respect to the conservation of historic continuity.

Typological classification on the national scale was tackled by Löw, Míchal (2003) in their publication Landscape Character which classifies a range of phenomena forming individual landscapes of the Czech Republic into wider frameworks.

The Spatial Projection of significant elements in the landscape of South-Moravian region, in the Map of Landscape Assessment (Mapa krajinářského hodnocení, 1978) the district of Hustopeče is defined as a landscape mostly residential with manufacturing facilities, at some places harmonic. The area north of the speedway is specified as an area of increased aesthetic value, whose aesthetics is however partly disturbed by agricultural regulation measures (especially wide agrarian terraces).

The same conclusion was arrived at in the landscape character assessment which moreover has to state that the territory is endangered by undesirable desolation and to mention high voltage power lines as another disturbing factor.

Hustopeče presents itself as a town of good wine; part of cultural-social actions from the rich offer in Hustopeče is connected with wine growing and producing. Most popular and visited are so called Burčákové slavnosti (Stum Festivities). This tradition of modern history began in 1995 and is to remind the famous history of Hustopeče as a seat of winery court. Hustopeče is also a significant point on winery cycling paths – Moravian Wine Path and Velkopavlovická Path. Newly opened at the beginning of summer 2006 was a track called Through the Land of Andre (Andre is the original Moravian variety of red wine, cultivated in 1961).

Wine-growing was in the past the main source of town's wealth; the present return to this tradition helps to maintain the historic continuity, both in peoples' minds and in the landscape. This cultural characteristic of landscape character cannot be forgotten as it points to what people adopt and what they expect from the landscape – in other words, what is important for the landscape to be perceived by them as "their" and to be bound with them. That is why the vineyards should remain in the landscape an identification feature which must not be neglected.

On the other hand, a kind of threat is mentioned by Agroprojekt (2006) in the Municipal Plan for the Hustopeče Cadastral Area nearly the whole Unit 3 was demarcated as an area possible for the localization of new vineyards. Here it is the conflict of interests because this unit entails both high requirements of nature conservation and the landscape character worth preservation combined last but not least with a high recreational potential (gardening, water reservoirs). Due to these aspects Agroprojekt (2006) suggests to downsize farming.

7. Conclusion

It is evident from the landscape character assessment that the cadastral area Hustopeče is exceptional in the representation of many landscape types on a small area, with the dense mosaic on a small-scale conditioned both by topography and by land use. Particularly the plots depending on the supply of human manual work are today threatened by extinction.

The paper is an excerpt from the PhD thesis of Markéta Flekalová, where landscape character assessment is the first step of research. It will be further extended and focused on the comparison of expert assessment result and perception of the landscape by local people, with respect to the requirements of European Landscape Convention (2000) according to which the contractual parties (and hence also the Czech Republic) undertake to define „their own landscapes in their territories" (with the landscape being defined in this convention as "a part of territory perceived by inhabitants") and to „assess the landscapes thus identified, taking into account the particular values assigned to them by the interested parties and the population concerned".

Landscape character assessment especially in combination with dialog with locals can help to find out attributes of "home land" and help to reverse negative consequences of the loss of the relation to landscape. On the local scale it can lower impact of globalization by preserving of unique values particularly on this small scale, which haven't the global significance, but are irretrievable for everyday life of locals. Setting of individual landscape character helps to strengthen identity of the region and identification of the inhabitants with their place of life and strengthen their interest for this landscape.

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CURRENT DEMOGRAPHIC CHANGES IN RURAL AREAS OF SOUTH-WESTERN POLAND, 1988 - 2002

Maria HEŁDAK, Olgierd KEMPA

Summary

Taking into account the high water events in the summer of 1813, the flood of August 1880 is one of the most severe natural disasters occurring in the Odra / Oder River Basin (especially on its right-bank tributary, Ostravice R.) in the 19th century. This flood is believed to be comparable with the flood disaster of July 1997. Having devastated the Ostrava region, it became for a long time a milestone for local people, who divided time into the period before and after its occurrence. This severe natural disaster is discussed in this paper with respect to its causes, contemporary local and regional experiences, and subsequent impacts and consequences.

Shrnutí

Současné demografické změny ve venkovských oblastech jihozápadního Polska, 1988-2002

Cílem této studie bylo analyzovat změny odehrávající se ve venkovských a příměstských obcích jihozápadního Polska v letech 1988, 1996 a 2002. Rozmanitost tohoto regionu může učinit z Dolního Slezska oblast pro Polsko reprezentativní. Studie potvrdila velkou prostorovou diverzitu procesu migrace, náhlý pokles hustoty obyvatelstva v obcích s nepříznivými ekonomickými podmínkami, příliv osob do předměstských oblastí velkých měst a klesající porodnost.

Keywords: *demographic changes, Lower Silesia, Lower Silesia Voivodship, Poland*

1. Introduction

Demographic problems which afflicted Poland after the Second World War influenced the economic development of the country as demographic processes have always been in relation with economic situation. During the reconstruction of the country after the last war, funds were directed mainly to the biggest towns which were destroyed most. Priority was given to the development of industry. Numerous factories and plants were built and the greatest development was observed in the centre of Poland, around the largest cities. It was there that the most jobs were created, first in the reconstruction after the war, later at building new factories and in the production. Since the post-war demographic structure was dominated by females, branches of industry were created to provide jobs for women (textile industry). Development of state agricultural farms was planned for peripheral regions. The industrial development led to a mass migration from rural areas to towns and cities.

The beginning of the 1990s brought a temporary decline in the economy resulting from changes in the Polish political system. Economic changes influenced demographic changes as well. Numerous production facilities and State Farms which proved unprofitable were liquidated forcing young people to migrate from rural areas to towns. As a limited number of jobs required gaining new skills and qualifications by young people, birth rate exhibited a significant decrease.

The analysis of demographic changes concerns the region of Lower Silesia located in south-western Poland, with diverse physical, geographical features, and socio-economic features. There are communes characterised by high economic growth in the region, as well as communes with a high rate of unemployment and economic stagnation, communes with high quality agricultural production space located mainly in the Odra River Valley, and communes with a need of restructuring and reorganisation, especially in mountain and sub-mountain areas of the region.

This diversity can make Lower Silesia a region representative for Poland. The Lower Silesia Voivodship is in the south-western part of Poland and its area is 6.4% of the country (Fig. 1). In the present study, changes in the population and the structure of Lower Silesia communities in the years 1988, 1996 and 2002 are presented in relation to the present demographic situation of the country. Numerous economic changes,

including the shift from planned economy to free market economy, were taking place in the analysed years. The changes led, directly or indirectly, to the transformation in rural areas, including the process of depopulation which was still taking place in 1988, being somewhat curbed by the wave of unemployment in 1996, and increased prices of flats in towns. Social support provided by the government such as subsidies for building corporate flats or organisation of leisure activities etc., was ended. Thus, the analysed years are crucial for the Polish economy inseparable from the demographic changes.

The aim of the study is to analyse the demographic changes taking place in Lower Silesia in the years 1988, 1996 and 2002 and to compare them with the existing demographic situation in the region and to present the demographic changes in the concerned years.

2. Methods

The project "Demographic changes in rural areas of Lower Silesia" was implemented within the grant No. 290/GW/06 of the Wroclaw University of Environmental and Life Sciences from 10 July 2006 to 31 December 2006. The study was conducted in the voivodship of Lower Silesia excluding separate town areas. The basic study unit was a commune described by using diagnostic features. Of 133 territorial units, 53 are town-rural communes and 80 are rural communes. Data published by the Voivodship Statistical Offices in statistical yearbooks, data from the National Census in 1988 and 2002, archive data of the Voivodship Statistical Office in Wroclaw and own observations were used in the analyses.

The analyses were conducted in thematic groups covering the growth of population and distribution in rural areas of Lower Silesia in the years 1988, 1996 and 2002 and changes in the natural migration of population. Each of the communes, proportionally to the degree of the given phenomenon, was placed in one of the groups depending on the accepted criteria. Cartograms with regions of various degree of demographic phenomena and cartograms presenting differences in the phenomena in the analysed years were prepared for each problem.

3. Growth of population and its distribution in rural areas

Processes of urbanisation are related to the conversion of agricultural population to the population based on non-agricultural activities and to the absorption of

Fig. 1: Location of Lower Silesia.
Source: www.mapa.szukacz.pl

rural population by the towns. Urbanisation accelerated significantly in Poland after the Second World War and by the year 2004, the percentage of town population increased by almost 50%. The so called urbanisation of rural areas is a characteristic feature of urbanisation processes taking place in suburban areas, especially around big towns. These areas adopt town features related to employment structure (growing number of persons employed in non-agricultural sectors), demographic structure, architecture etc. (Michałków, 2000, 2002; Fierla, 2004). Similar trends are also observed in the eastern lands of Germany (Schöler, 2002). The changing structure of towns has been observed for many years, first in the U.S.A. (see: Grubb, 1982; Mills and Price; Mills, 1992) and for ca. thirty years also in Germany (see: Russig 1979; Seitz 1996). Companies move their sites from town centres to suburbs and households are moving from densely populated places to those with a lower density of population. Such changes are referred to as sub-urbanisation. Households change their preferences with respect to their expectations from the new location (Schöler, 2002). Sub-urbanisation is also taking place in Polish towns, not only in those with the population of over 500 thousand (Warszawa, Kraków, Katowice, Łódź, Poznań, Wrocław), but in much smaller ones as well.

According to the Main Statistical Office, the population of Poland was 38 million 200 thousand in 2006. As far as the population size is concerned, Poland is on the 30th place in the world and on the 9th position in Europe. Average population density in Poland is 122 persons per 1 km^2 (50 in rural areas).

On 6 December 1988, the population in areas which are now in the Lower Silesia voivodship amounted to 2,948.2 thousand (data based on the results of censuses). On 20 May 2002, the population was 2,907.2 thousand. Difference between the years 1988 – 2002 (in thousands) is –41.0 (Hełdak, 2006). In 2005, the population of Lower Silesia was 2,888.2 thousand. Within 17 years, the population of the whole voivodship decreased by 1.02%. At the same time, in the 17 years used in the analysis, the population of rural area in the voivodship decreased.

Spatial differentiation of migration processes in rural areas reflects to some extent in the changes of population density in the communes. Cartograms presenting the density of population in rural areas of Lower Silesia in the years 1988, 1996 and 2002 were prepared in the study. A cartogram presenting the difference in the population density in rural and town-rural communes of the voivodship between the years 1988 and 2002 per 1 km^2 is presented below (Fig. 2).

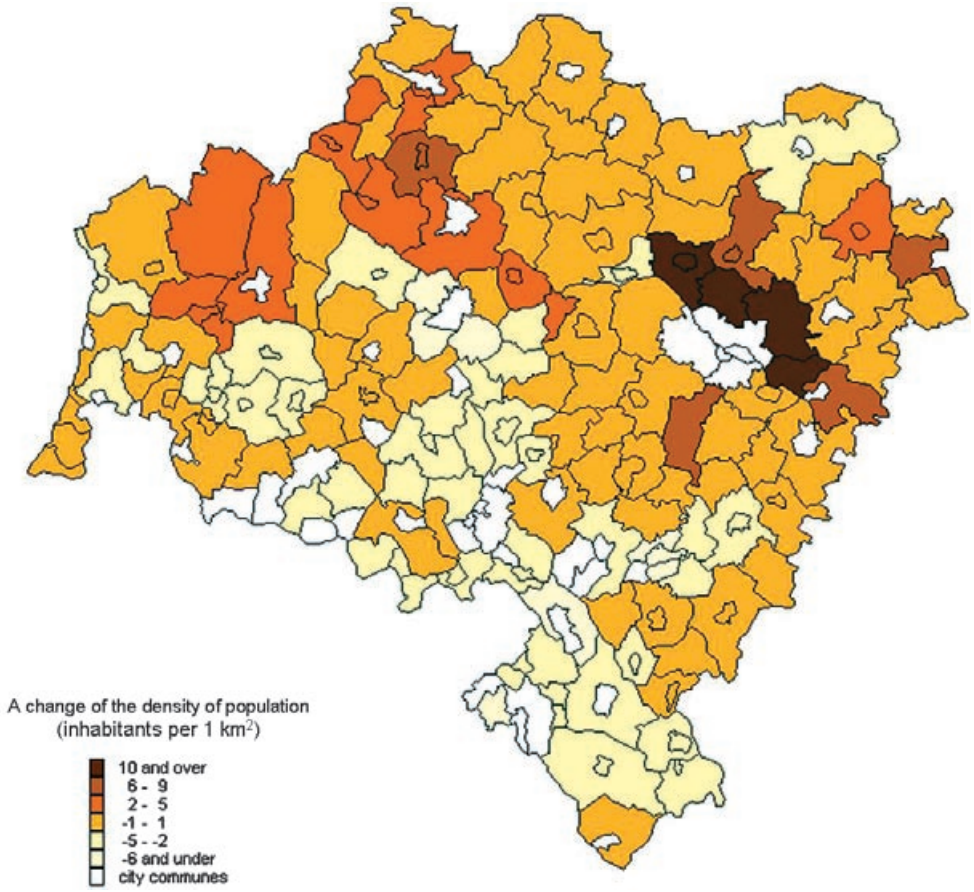

Fig. 2: Difference in population density between 1988 and 2002 in rural and town-rural communes of Lower-Silesia.

The analysis of spatial arrangement of regions with different population densities between the years 1988 and 2002 shows that the communes in which the number of population per 1 square kilometer was at the same level are still in majority (ca. 46% of the total number of communes – 61). However, this difference is smaller than between the years 1988 and 1996, when over 76% of communes belonged in this group. The regions with lower density of population are mainly located in the southern part of the Lower Silesia voivodship. In the communes located in the north and mid-east of the voivodship, an increased density has been observed. The communes are located in the region of Wroclaw, Lubin, Polkowice and Boleslawiec, i.e. in the vicinity of big and rapidly-developing towns. Migration to the suburban areas of big towns is a growing phenomenon. With increasing prices of flats, building a small house is frequently less expensive. This becomes a driving force for the investments in family house building industry. Building sites are more often bought outside the towns, which leads to urban development of suburbs and, at the same time, to increased population in these areas.

4. Changes in migration

Birth rate played an important role in the increase of population in the post-war Poland. Living conditions were stabilised after the war and the number of marriages started growing. Birth rate reached 16% in 1946 and 19.5% in the mid-1950s. Then, in the late 1960s and early 1970s, a decline was observed and birth rate was ca. 8.2%. In the 1970s, birth rate increased again as the population born in the 1950s reached the age of getting married, a so called echo of the post-war baby boom. Birth rate stabilised in the mid-1970s and reached ca. 10%. A slow decrease was observed in the 1980s and in 1998 the rate was 0.5% and 0% in the year 1999 (see: Michałków, 2000, 2002; Fierla, 2004). Birth rate depression is increasing and results from the economic situation of the country as well as from the changing attitudes and procreative behaviours.

The economic transformations taking place in Poland and resulting in e.g. ownership transformations in economy, imbalance on the labour market, lowered industrial potential in some regions and, most of all, change of the family model, brought about irreversible changes such as e.g. changes in birth rate. The analysis of births and deaths is of primary importance for the analysis of migration (Holzer, 2003). Demographic prognoses foreseeing the negative birth rate in Poland appear to be correct. The trend of falling birth rate is already visible. In the year 2004, the demographic trends in Poland did not differ very much from those observed at the beginning of the 1990s. It was the sixth year in which the population decrease was observed and the third year with the negative birth rate. The significantly lower number of births is a direct reason of population decrease. In the years 2000-2004, as a result of low birth rate and negative balance of migrations abroad, the population of Poland decreased by ca. 80 thousand persons. Birth rate was negative and reached from -0.2% in the year 2000 to -0.4% in the year 2004 (Main Statistical Office).

The analysis of data concerning birth rate per 1,000 inhabitants in rural and town-rural communes of Lower Silesia showed a systematic decline in the number of births from the year 1996 as compared to 1988. The study presents figures on the birth rate in the analysed years and changes in the migration of inhabitants from rural and town-rural communes. Cartograms were prepared presenting the changes of birth rate in 1996 compared to 1988 and in the year 2002 compared to 1988. This study brings only the cartogram showing birth rates in 1988 and 2002 (Fig. 3).

The analysis of the numerical data and spatial arrangement of the communes concerning birth rate in 1988 allows conclude that the communes characterised by moderate birth rate according to D.J. Bogue scale of size classes (from 5 to 10‰) prevail (Urban, 1989). The communes are evenly dispersed all over the area of Lower Silesia and their number is 73 (54.88% of all rural and town-rural communes). At that time, 31 communes located mainly in the south of the voivodship, in the Klodzko Valley and in the Jeleniogorska Valley, were characterised by low birth rate (from 0.1 to 5‰).

It should be stated that, in the analysed period, there was positive birth rate in a vast majority of Lower Silesia communes and most of them were characterised by moderate rate. It was a very advantageous demographic situation of the region, characteristic for the entire territory of Poland.

The analysis of the cartogram from the year 2002 showed that birth rate was higher only in a few communes (8 rural and town-rural communes). In the remaining communes, the birth rate decreased at various levels as compared to the year 1988. The decrease in 2002 was much higher than that in 1996 and concerned the whole region. Thus, it may be stated that the difference in birth rate between 1988 and 2002 is much higher than between 1988 and 1996. It shows the trend of decreasing birth rate in the period 1988 – 2002. The data of the year 2005 show that the region is still characterised by negative birth rate, which is very worrying and characteristic for the whole country.

5. Conclusions

The high spatial diversification of migration in Lower Silesia results mainly from the economic changes in Poland

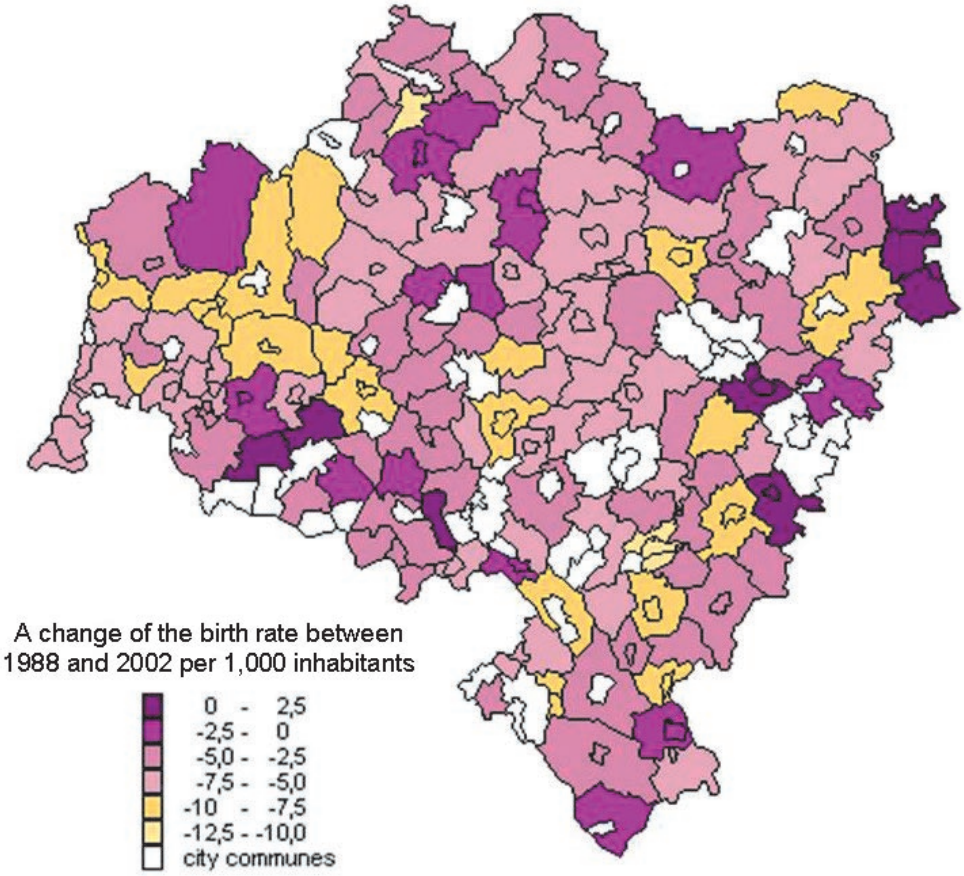

Fig. 3: Difference in birth rate between 1988 and 2002 in rural and town-rural communes of Lower-Silesia, in per mille.

and in the voivodship. Intensive internal and external migrations were taking place mainly in two directions: from rural areas to towns and from less developed regions to more industrialised ones (economically developing). A rapid increase in the density of population is currently observed in communes located in the vicinity of towns, in the surroundings of Wrocław, Lubin, Polkowice and in the region of Bolesławiec. This trend confirms that the process of sub-urbanisation is taking place. The decreasing population density in the south of Lower Silesia is worrying. The region of Klodzko Valley and Wałbrzych, situated in the south of the voivodship, where many branches of industry have collapsed (brown coal mining, textile industry), belongs in the group of problem regions.

The analysis of selected demographic phenomena allows do draw the following conclusions.

The analysis of birth rate shows that there are unfavourable demographic trends in rural and town-rural communes. In the year 1988, negative birth rate was observed only in two rural and town-rural communes, whereas in the year 1996, the number grew to 42 and, in the year 2002, to 76 communes in the total of 133 regions which were analysed.

The demographic situation of the communes may be better evaluated if it is known what age groups migrate most often as it is the migration of young people which results in the process of population ageing and in the region depopulation. A further study should be conducted including the analysis of migration scale in different age groups. The study should also analyse if the demographic indices observed in the region, in the so called regained areas, are similar to those observed in other parts of Poland.

The unfavourable demographic situation is observed in the whole of Poland. Based on the data available, it is difficult to present the influence of economic transformations taking place in the country and in the region on the birth rate taking into account that positive birth rate is observed in the regions which are less economically advanced.

In the above context, it would also be interesting to find out if the observed demographic changes result in, or are caused by functional changes of the region. This problem should also be analysed in a further study.

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PLACE AND ROLE OF THE CENTRE IN THE SPATIAL STRUCTURE OF A SMALL TOWN IN POLAND

Agnieszka KWIATEK-SOŁTYS

Abstract

The market squares of 11 of the 44 small towns of Malopolska Province were the subject of this research study: partial findings are reported in this paper. A survey was carried out in the selected towns in the spring of 2007, in order to demonstrate the role of market squares as perceived by residents and visitors. The survey questions concentrated on frequency of visits and reasons for coming to the market square, any potential need for changes, levels of satisfaction with the place and its attractiveness, and on traffic problems. The structure of retailing strategies is as important in the surrounding streets as in the market square itself. Another important component in the studies was the place of towns on Internet sites, checking to what extent the market square is an element of town promotion and image. The goal of the study was to determine whether the market squares can be considered centres of small towns.

Shrnutí

Místo a role centra v prostorové struktuře malých měst Polska

V článku jsou prezentovány dílčí výsledky studia funkce tržišť v jedenáci z celkového počtu 44 malých měst Malopolského kraje. Na základě dotazníkového šetření provedeného na jaře 2007 autorka ukazuje na význam obchodní funkce tržišť jak z pohledu obyvatel města, tak jeho návštěvníků. Dotazníkové šetření bylo zaměřeno mimo jiné na zjišťování frekvence a důvodů návštěv tržišť, jejich atraktivity, dopravních problémů a žádoucích změn. Významná se jeví struktura maloobchodní nabídky jak na tržišti, tak v přilehlých ulicích. Dalším významným faktorem, který byl zkoumán, je prezentace měst na internetových stránkách a ověření do jaké míry je tržiště elementem propagace města a jeho image.

Cílem práce bylo zjištění, zda tržiště je považováno za centrum (srdce) malých měst.

Key words: *town, spatial structure of towns, market squares, Poland*

Introduction

Small towns and towns of the Malopolska Province have become the subject of the author's particular research interest (Kwiatek-Sołtys, 2005). Small towns, meaning towns in the population category below 20 thousands inhabitants, were taken into consideration. The paper focuses on the spatial structure of towns and on the place and role of their market squares. The presented article is part of a more extensive postdoctoral research on the ownership land structure of small towns, where the land belonging to the communes (together with the mentioned market squares) is greatly important.

Small towns of the Małopolska Province and whole Poland represent a diversified collection of elements both due to their geographical location, genesis, functions and size. All these elements exert an important influence on the spatial structure and on the growth of towns under consideration.

The present urban structure of the Malopolska Province consists of 57 cities and towns. 32 of them received their city rights in the Middle Ages; Stary Sącz (1260), Skała (1262), Kęty (1277), Wieliczka (1290), Miechów (1290) and Zator (1292) are the oldest of all small towns. Six small towns were given their city rights between the 16th and 17th centuries. Six other towns came into being between the 18th and the 19th centuries and two more (Trzebinia and Krzeszowice) at the beginning of the Second World War. Economic and political changes after the World War II brought 8 new towns and almost all of them had specialized functions (Rabka, Szczawnica as health centres, Brzeszcze, Bukowno, Chełmek, Libiąż, Sułkowice and Świątniki Górne as industrial towns and Mszana Dolna in its service and recreation role. 11 of the towns regained their lost city rights in the 20th century. These are Proszowice, Słomniki and Wolbrom, which had them back earlier in 1923, 1917 and 1930 and after World War II it was 8 towns: Skała in 1987,

Alwernia in 1993, Nowy Wiśnicz in 1994, Ciężkowice in 1998, Czchów in 2000, Ryglice in 2001, Zakliczyn in 2006 and Wojnicz in 2007.

Consequently, the loss of the city rights, the industrial growth and new housing estates were important factors influencing and changing the spatial structure of small towns as new centres were built or sometimes even the centre was moved into a completely new place (Górka, 1986).

Another important element which is somehow derivative of the ones mentioned above is the size of the town (Fig. 1). The spatial structure of a bigger one among small towns is usually more complicated. Small towns of the Malopolska Province, also in this case, differ significantly. The biggest towns are close to middle sized towns due to the growth as Wadowice or Libiąż or to the depopulation such as industrial Trzebinia, which used to be a middle sized town, are populated by almost 20 thousand. The smallest ones hardly reach 2 thousand (Świątniki Górne or Zakliczyn). 31% of towns in the Province are populated by less than 5 thousand, 38% between 5 and 10 thousand and by 15% for 10-15 and 15-20 categories. This structure differs from the one of the whole country, where the smallest towns make 40% of all (Rajman, 2000-2001).

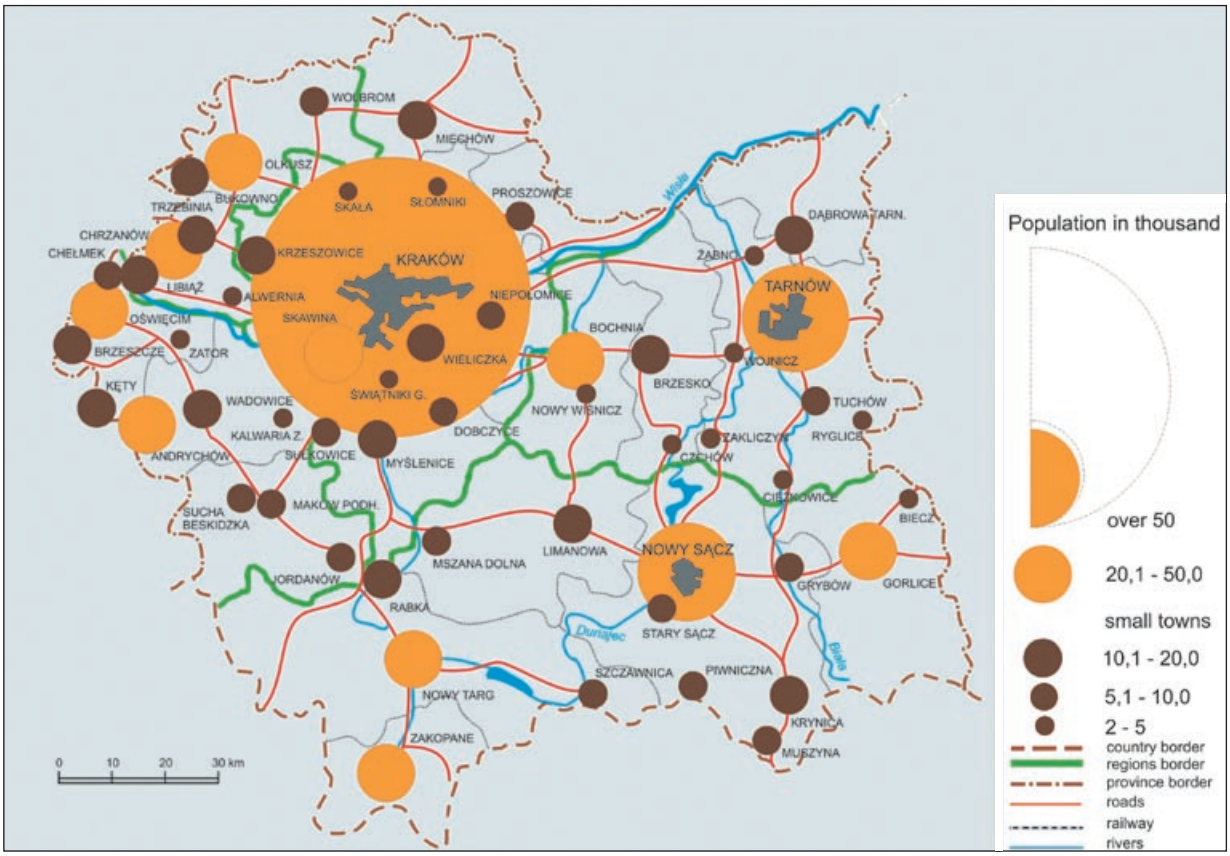

Fig. 1: Size structure of Malopolska Province municipalities in 2007.

Moreover, another factor influencing the spatial structure is the geographical location, especially in terms of roads. The development of towns situated far from the main roads is different from the towns which are sometimes crossed by a country road. Ring roads are a big problem. It is difficult or even impossible to develop any cultural activity on market squares which are crossed by a busy road. The aspect of location is nowadays additionally important in terms of the influence of the Krakow agglomeration. The economic activity develops fast in some of towns in a close neighbourhood of Krakow (Kwiatek-Sołtys, 2004). The new economic units partly refer to the present or completely change the spatial structure of towns.

The observation and field work in small towns together with the analysis of their plans allow distinguish a few morphological types of towns. These types are as follows:

- homogeneous towns with the central position of a market square – these are usually the smallest and older (middle aged) towns (Skała, Stary Sącz)
- combined towns with a market square and with other functional districts clearly marked. These are rather bigger towns (Myślenice, Wieliczka)
- towns without a market square, developed along one main street. These are usually new units such as Świątniki Górne or older ones like Sucha Beskidzka

- towns where the function of the centre was moved into a new place (partly because of the lost city rights in the past such as Alwernia, Proszowice)
- towns which are more like worker settlements rather than towns, with underdeveloped centres (Libiąż, Sułkowice).

Results of the survey

In May 2007, a field work was carried out in 11 towns of the Malopolska Province[1]. Towns with a market square were chosen to find out whether the market square is important or not in the town. The chosen towns were: Alwernia, Kalwaria Zebrzydowska, Myślenice, Proszowice, Skała, Słomniki, Sułkowice, Trzebinia, Krzeszowice oraz Niepołomice. The aim of the studies was to gain people's opinions regarding the role of the market squares together with the detailed cataloguing of economic units present on the market squares. Responses from 1,117 subjects were gathered in 11 towns under consideration, which makes about 1% of the total population of towns. 55% women and 45% men of different age were examined. The group aged between 18-60 years was the biggest one (63%), the next one at the age under 18 (19%) and the last one (18%) aged 60 and over. Most respondents (58%) had secondary school education, 20% primary and 22% higher education. The origin of the examined subjects and different points of view by "local people" and visitors seemed to be an important aspect when starting the research, because 59% were people living in the examined town, 21% came from the local commune and 20% were visitors. Visitors came mostly from the neighbouring communes and from Krakow, but sometimes like in Krzeszowice were a spa centre exists they came from Kielce. In Wieliczka they came from Warsaw or Silesia or in Myślenice from Lublin or Wałbrzych. There were three questionnaires filled by foreign visitors one from Hungary, who came to visit a family in Skała and two tourists from the Czech Republic in Myślenice.

Frequency and reason for coming to the market squares were the first questions to be answered. It was found out that 39% come to the market squares every day, 28% couple of times a week, 17% once and 16% rarely (Fig. 2). However, the answers depend on the role of the market square in the town. In towns where the centre is situated in a different place as is the case of Alwernia, Wieliczka or Proszowice people rarely come to the market square every day. The analysis of the reasons for coming to the market square (more than one reason could be stated) showed that the main reason was shopping (Fig. 3). In all towns such a reason was given by 33% respondents and other reasons were less frequent. There were no significant differences among towns and only in Alwernia the answers differed, while Wieliczka or Proszowice were close to the average. Similar situation was seen when respondents' answers, who gave only one reason for coming, were analysed. Shopping was at the top of the list with even the higher position (41%) and again in Alwernia fewer people come for shopping to the market square. Most people (65%) mentioned shopping as the main reason in Krzeszowice.

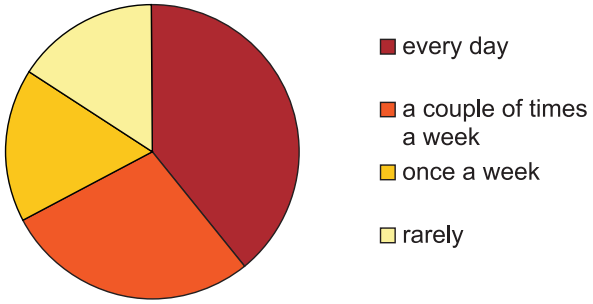

Fig. 2: Frequency of coming to the market squares.

16% of answers were office business together with bank visits (but only 5% as a one reason) what can be explained by the fact that shopping was somehow the accompanying reason.

Moreover, market squares are mostly the place for walking and meetings (respectively 17 and 12% of all pointed out reasons and 14 and 9% among one reason points). Some differences could be seen here. 23% of young people (under 17) come to the market squares for a meeting and only half of that between 18 and 60 and over 60. It looks that the market squares are a bit as honey pots for youth and are not attractive to older population. It is also worth pointing out that only 1% of respondents mentioned the reason for coming a restaurant or pub. Among over thousand respondents only 58 people said that they come to the market square for cultural events. It can be assumed that the cultural function of market squares is undeveloped and needs attention in towns. It is true that towns or school stadiums are often better places for such events especially if market squares are crossed by main country roads.

The problem of traffic was another problem revealed in the questionnaire (Fig. 4 and 5). Respondents were asked whether traffic is a problem for them and whether it should be eliminated from the market squares. For over a half of all respondents it is troublesome, mostly in Kalwaria Zebrzydowska, where there is a country road and no good provision for pedestrians. 86% of respondents said it is troublesome there but only 12% of them would like to close the market square to traffic.

[1] 1,117 questionnaires, which make about 1% of the population of towns under consideration, were filled, with the help of the third year students of Geography during their fieldwork. The survey was carried out at different places in the towns, not only on the examined market squares and in some examples the identification of the market place for respondents was not an easy task.

The average for all towns is similar 18% would like to close the market squares, 32% would like to close them partly and 45% think that they should not be closed. It is so because it is convenient to park directly in front of the shop for those who go shopping.

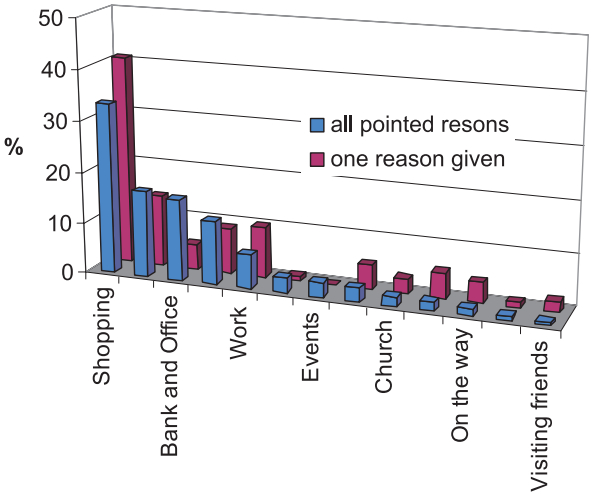

Fig. 3: Reasons for coming to the market square. Source: author

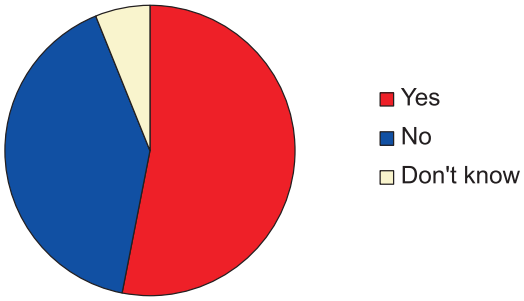

Fig. 4: Is traffic a problem on the market square?

Another issue in the questionnaire was what respondents find or like best at the market square. There were of course different answers, characteristic things for each town were pointed out often such as figurines, monuments but as many as 22% respondents said that they like nothing and next 2% did not know. Some of the most frequent answers were greenery (14% respondents) and fountains (9%). Only 3% of respondents like shops, which are, on the other hand, the common reason for coming to the squares and there are no many differences among towns.

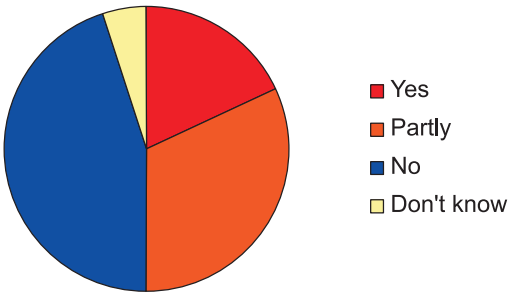

Fig. 5: Should the market square be closed to traffic?

Next questions were about the need for changes, defects and feedback regarding last changes. On the one hand, as already mentioned, most respondents are dissatisfied. There is nothing to be changed and I do not know were the most frequent answers. The answers differed according to the educational background of respondents. The lesser educated did not want to change anything (18% among secondary school education and 17% among primary education). Well educated stated that changes are necessary (89%). The need for renovation of buildings, reconstruction of roads and pavements is seen by 14% respondents, other 11% want more greenery, 9% want to normalize the traffic, especially to reduce traffic, and to reduce parking places, but there were of course also answers to build more parking lots. The lack of restaurants and pubs was stated by 6%, 3% want to make the market square more attractive by organizing festivals and concerts there. The problem of drunks on the market together with cleanliness was among other frequent answers. Answering the question for changes 45% respondents said that nothing is changing. Other answers were positive and concerned renovation, reconstruction or improved cleanliness.

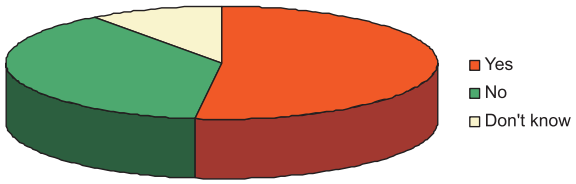

Fig. 6 Is the market square attractive?

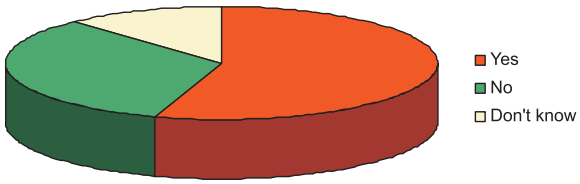

Fig. 7: Is the market square attractive to visitors?

The last set of questions was related to the attractiveness of market squares in small towns, and questions about the centre and the heart of the town. Are the small towns' market squares attractive? (Fig. 6 and 7) It is difficult to give one yes or no answer as the markets squares appeared attractive to a half of the respondents and even to more visitors but the differentiation between towns is significant. The less attractive is the market square in Krzeszowice (24% of all respondents said yes and only 14% visitors). The town square is big there and there is a busy traffic along and across it, it is also partly built–up and there is a park with a fountain on the western side. For some respondents there was a problem with the identification of the place they were asked about. By contrast a market square in Myślenice is a closed, unbuilt-up area. It is attractive to 83% of local respondents and to 85% visitors. For 65% of

respondents market squares under consideration can be regarded as the heart of town (Fig. 8 and 9). Only in three cases (Sułkowice, Alwernia, Wieliczka) there were fewer answers. In Wieliczka the most important part of the town is the salt mine (while for example in Kalwaria the monastery was not mentioned in this respect). The problem of the town centre was seen differently and the differences between local and visitor respondents were small. According to 58% the market is the main part of the town, 36% think it is not and 6% do not know. Here again the differentiation between towns is significant. Indications of the most important part of the town did not take into consideration market squares in towns with other important objects such as the salt mine in Wieliczka, Kalwaria Zebrzydowska with the monastery on the UNESCO list, Krzeszowice with the Potocki's Palace or in Alwernia where a new centre has been built.

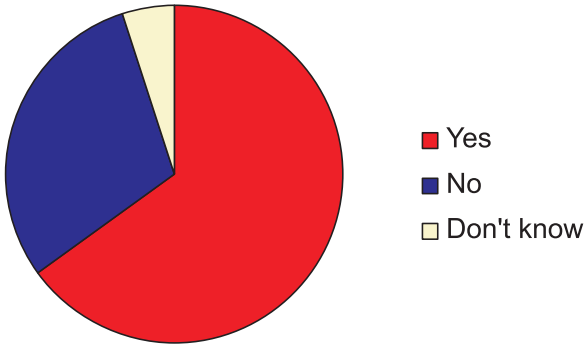

Fig. 8: Can the market square be regarded as a heart of town?

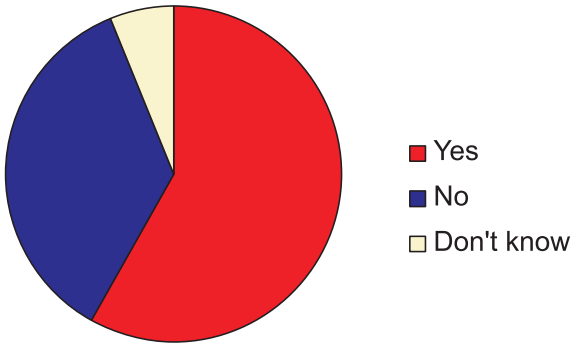

Fig. 9: Is the market square the most important part of the town?

Structure of economic activities at market squares

The detailed cataloguing of economic activities was the next step in the studies. The highest number of economic units (67 each) was recorded in Myślenice and Krzeszowice (Fig. 10). Kalwaria Zebrzydowska is placed in the next position (46 units). A lower number was observed in Sułkowice and in Alwernia only 5 units. This quantitative distribution of economic units is based on the role and importance of the town itself as well as on the rank of the described market squares. It is difficult or even impossible to give the share of units on market squares in whole towns as small economic units which are most common, employing less than 9 people are not included in the official statistics.

Trade is on the first place in every town in the structure of economic activities. It takes 64% of total units. Its share varies from less than 50%, due to different reasons in Proszowice, Alwernia and Myślenice, up to 81% in Trzebinia. Grocer's shops clearly dominate (21%), followed by shoe and garment shops (15%) and home electronics shops (8%).

Service units making 16% of the total come next. Their share is highest in Proszowice and Myślenice while in Trzebinia and Sułkowice there is only one such a unit and none is to be found in Alwernia.

Financial institutions somehow reflect the level of town development. The share of these is not high yet (6% of total) and they are well presented in Wieliczka and Niepołomice and absent on the market squares in Słomniki, Proszowice and Alwernia. Restaurants and pubs, schools and offices come next in the structure of economic activities.

Internet sites were also the subject of interest. The author's aim was to find out whether they are good enough and whether they contain information and pictures of the market squares. The best web site with a picture of the market square was found for Myślenice what confirms its best position among all towns under consideration. It can be said that only two of eleven towns have their web pages well developed and in the others there is still much to be done.

Conclusion

The research shows that small market squares under consideration play mostly trade functions in towns. They are not an important element of the town's promotion and image and the local governments should keep working to make them more attractive. Tourist development and creation of good atmosphere for tourists and inhabitants are the main aims for almost all small towns now. Market squares should be attractive places for meetings, places which should be nice, clean, eye-catching, where the visitors can not only stop and take a picture but also drink coffee or have lunch in a friendly atmosphere. It can be assumed that the cultural function of market squares is undeveloped and needs attention in towns. Local governments followed the example of big and medium sized cities and try to improve the situation what is however not an easy task as the small towns for many years have been underresourced, market squares have been dull and neglected. In some towns which already have other interesting tourist sites (such as a salt mine or a monastery) making small market squares more attractive can additionally attract tourists who come to see the

places of interest making them stay in such towns longer which would be profitable for all. There is not a simple correlation between the economic level of a town or its size and inhabitants satisfaction. On the other hand, the biggest and one of the best developed among towns under consideration has, at the same time, the best position in the presented research. It is worth emphasizing that activities of local governments should take into consideration inhabitants´ needs and preferences in doing which the presented research could be of some help.

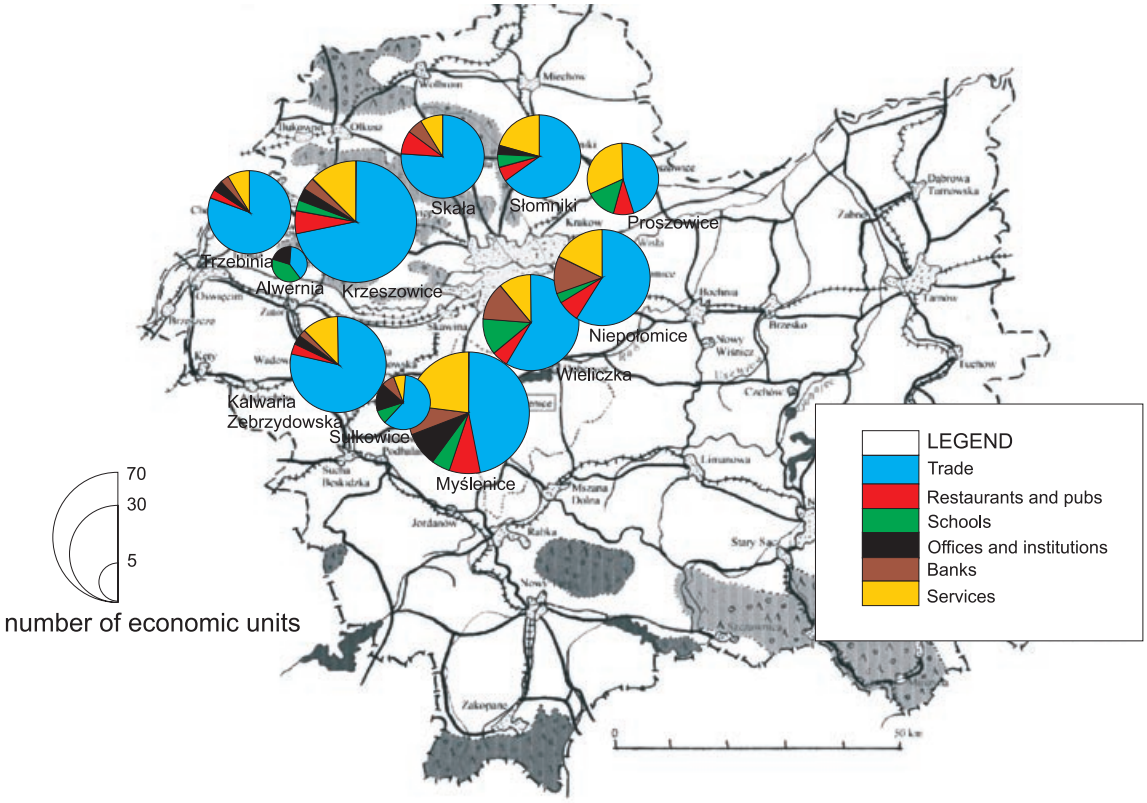

Fig. 10: Economic activities on market squares of selected small towns.

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SIGNIFICANT CHANGES IN THE CHARACTER AND FORM OF VILLAGES IN THE ZŁOTE GÓRY MOUNTAINS BOUNDARY REGION (POLAND)

Jerzy OLESZEK

Abstract

Rural settlement units in Poland, on the western slope of the Złote Góry Mountains, in Lądek Zdrój commune, Kłodzko district in Lower Silesia province, are examined in this paper. The aim of the research project is to define the existing situation, the current forms of rural area management, and to offer directions for future development. Firstly, it is assumed that the character of the settlement structure cannot be changed, and that the given settlement unit has to retain the specific features of a village. A second assumption is that specific qualities of the cultural milieu of the given area should not be lost. The results of this analysis show that actions taken in the 1950s resulted in the elimination of cohesion between settlement units, leading to their isolation, and a decreased potential for village units of settlement.

Shrnutí

Významné změny charakteru a formy vesnic v okrajové oblasti Gór Złotych (Polsko)

Tato studie zkoumá venkovské sídelní jednotky v Polsku, na západním svahu Złotých hor v obci Lądek Zdrój v okresu Kłodzko v Dolním Slezsku. Cílem výzkumu je definovat stávající status quo, zhodnotit současné formy managementu této rurální oblasti a nabídnout směry pro její další rozvoj. Zaprvé se usuzuje, že charakter sídelní struktury nemůže být změněn a daná sídelní jednotka si musí udržet specifické rysy vesnice. Za druhé nelze ztratit specifické hodnoty kulturní úrovně dané oblasti. Výsledky analýzy ukazují, že opatření, k nimž bylo přistoupeno v 50. letech minulého století, měla za následek ztrátu soudržnosti mezi sídelními jednotkami, jejich izolaci a snížení potentiálu vesnic.

Keywords: *rural area development, villages in the boundary area, rural area management, Poland*

1. Introduction

When analyzing villages in the boundary area it is assumed that their administrative border coincides with the state border. All previous studies show the uniqueness of villages in the Kłodzko district. However, their distinctive feature is not the current population number, but the relation between the current number of inhabitants and the number of population before 1945. According to previous studies, the current population number of given settlement units amounts to not more than 25-30% of the population number before 1945 (Oleszek, 1992, 2000). Such situation resulted from certain administrative arrangements made in the boundary zone. The area was considered to be an isolated territory with limited access. Local population was placed under many restrictions that limited free communications with other places outside the area. The authorities eliminated a lot of existing off-agricultural determinants relevant to the creation and development of settlement units, without offering any alternative solutions (Oleszek, 1992). Those determinants were: local factors and stimuli regarding individual villages and structural factors concerning interactions between settlement units.

When defining the phenomena of villages in the boundary area, we cannot pass over the characteristics of villages in the whole area. It is important to emphasize the disruption of former continuum after 1945. It resulted in degeneration of a unique and long-lasting cultural milieu, whose main element was the so called glätzisch – the unique dialect of Kłodzko – which strongly united the local community (Bernatzky, 1988). Moreover, Catholicism was the prevailing religion in the area (Güttler, 2003). Great importance of religion in social life can be demonstrated by the existence of many small sacred objects in the area and in the rich baroque

furnishing of local churches. What is also important, both sides of the border were inhabited by people of the same ethnic descent before 1945.

After the war, the area experienced some changes. However, it is the modern period that seems to be more important for this study. The results of actions taken in the last 50 years seem to be very problematic. The biggest trouble is the current form of villages in the boundary area examined not from a detailed perspective that indicates variety of meanings, but from a fundamental and cross-sectional perspective. However, there is also an application perspective – knowing the characteristics of a given village, it is possible to identify ways of development which would carry on the historically determined morphological or functional systems of such a village.

To solve this problem we use identification analysis of current development and management of the area, together with direct surveys and study of exploratory source materials.

Fig. 1 shows the researched area – on the western slope of the Złote Mountains, in Lądek Zdrój commune, Kłodzko district, in Lower Silesia province. However, the analysis may also include settlement units in the Rychlebské Hory Mountain Range in the Czech Republic.

Fig. 1: Territorial scope of research.

2. Significance of the potential of settlement units

When analyzing the relevance of the potential, we use two main parameters:

- population number – namely, significative characteristics of changes in population number (Fig. 2);
- state of development and management – namely, the way of use analyzed from three perspectives: the function of buildings versus the way of their use, proportions in buildings' outline and their state of repair.

Finally, some qualities of rural landscape can also be useful for the analysis.

2.1. Rural population number

The analysis covered the following villages: Orłowiec, Wrzosówka, Wójtówka, Lutynia, and Karpno. Previously stated deductions were supplemented with the phenomenon of declining villages, which used to be inhabited by ca. 100–150 people before 1945. Currently there are only ruins, fragments of walls, or basements left, as it can be seen for example in Wrzosówka or Karpno villages. Different situation can be seen in Wójtówka village, where the population number of 107 in 1939, decreased to ¾ after the war, and presently it amounts to ca. 45 inhabitants. There could have been a few reasons why the dynamics of decrease in population number was so low and why the unit avoided a complete depopulation. The main impetus was the accumulation of new buildings in the area, e.g. holiday houses and buildings owned by the foundation working in the field of rehabilitation through work in ecological gardening. Most of farmers in the area produce little food because they do not cultivate land. Their main source of income is casual work outside the village and/or other sources of income such as old-age pension, disability pension etc.

Taking into account neighbourly relationships between the local community and visitors, or possibility of work in the foundation, the existing structure can be defined as a relatively simple but still multifaceted feedback system. Additionally, in Wójtówka there are no ruined or devastated buildings.

Another factor supporting such system is the location of the village – in the area there is a forest complex, which separates the village from the road Lądek Zdrój – Złoty Stok. It works like a "lock" that limits the access to the area. Only directly interested people can find the village.

In the group of analyzed villages there are two, which stand out against others – they are administratively registered but completely deserted: Wrzosówka (located near Lutynia and Wójtówka villages); and Karpno that used to be a small colony with two country taverns (one of them was widely known "Zum Weissen Löwen"). Before 1945, Karpno was a tourist place and a nice summer resort for sanatorium patients from Lądek

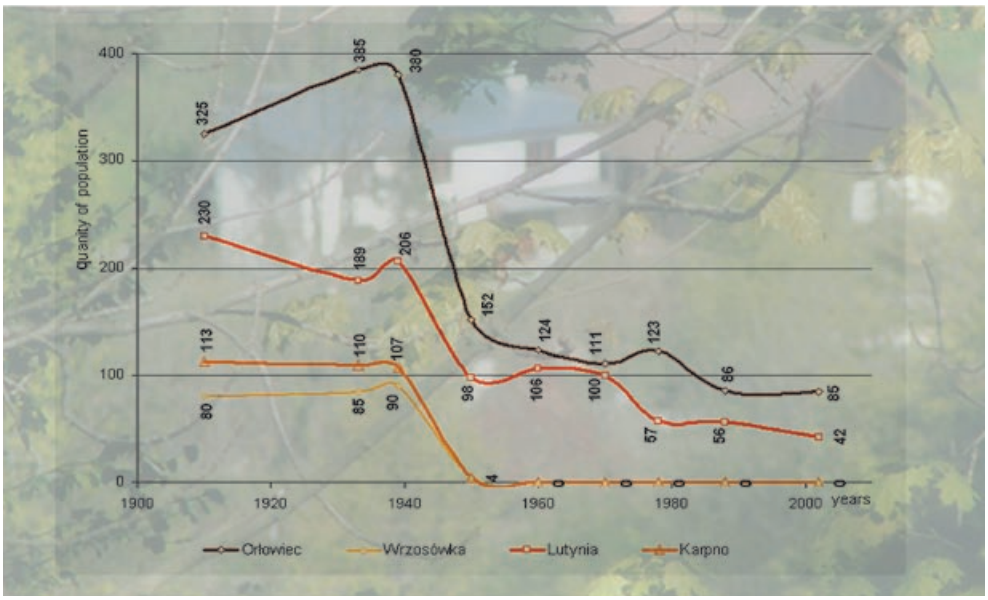

Fig. 2: Dynamics of changes in population number in the analyzed area.

Zdrój. That is why it was joined to the network of tourist trails marked out in the city forest (Rybka, Ceglecka, 1999). The summer resort had been working until all inhabitants left the area. Till 1983, there was also a border crossing at the Karpowska Mountain Pass which was reopened only in 2004. In the area there are still two working border crossings: Lutynia – Travná and Nowy Gierałtów – Uhelná.

Nowadays in Karpno there are only ruins of a medieval castle and a restored chapel used by local hunters. Presently it is impossible to identify any settlement developmental factors which existed before 1945 because they were not continued and did not undergo revitalization works.

On the other hand, in the interwar period there were a dozen farmyards in Wrzosówka village. The village had about 85 inhabitants; there was a 4-class school, a building of the border guards, a mill, a chapel, and a country tavern. The tavern was located near a hiking trail (Wanderwege) from Lądek Zdrój to Góra Borówkowa – the highest mountain peak in the area. Nevertheless, since the autumn of 2006 anyone can admire beautiful and amazing landscapes extending down to the Śnieżka Mountain and formerly known only from books (Wziątek, 2000).

After 1945, a few attempts were made to settle Wrzosówka with new inhabitants. At the beginning, there were eleven new settlers and in 1970 only two. In

Fig. 3: Present-day landscape of Lutynia village – eastern side: a) in summer, b) in early spring. (Photo: J. Oleszek)

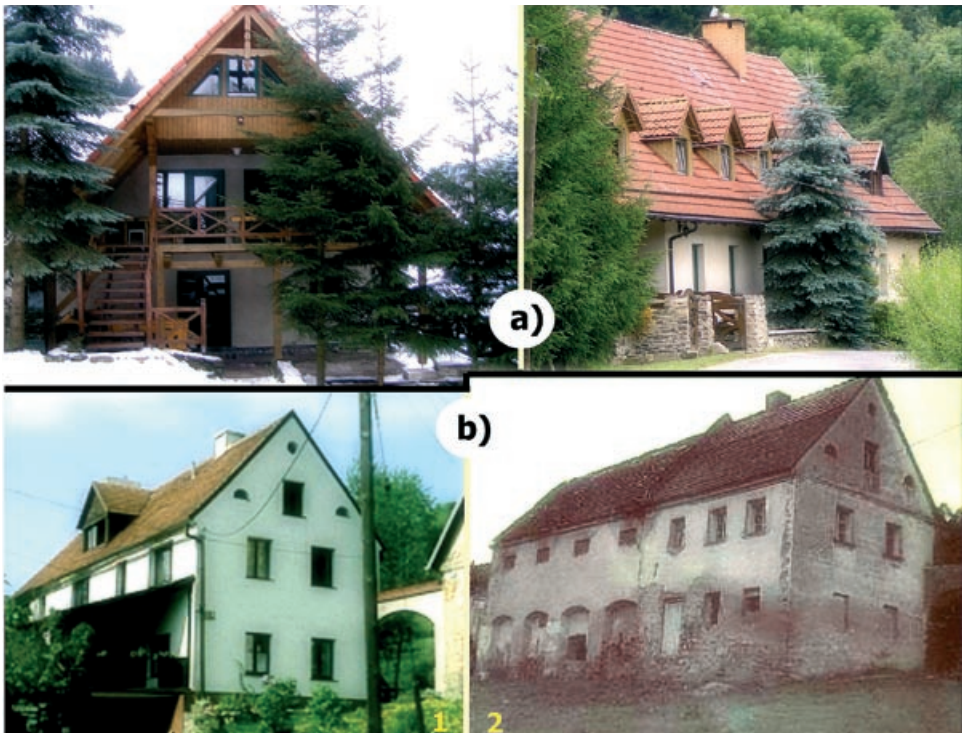

Fig. 6: Agrotourist buildings in Orłowiec:
a) a boarding-house, b) a holiday house; 1) present state, 2) before revitalization. (Photo: J. Oleszek)

the 1970s, service grazing and folding was carried out in Wrzosówka. However, all attempts made to stop gradual degradation of building substance and further decline of a specified settlement unit failed.

Another examined village is Lutynia that lies in a valley cut into Luty Potok. Its population equals to ca. 42 people – 1/5 of the population from before 1945. Additionally, in the 1950s there lived about 50% of the population from before 1945. Thus, we can see how strong the process of decreasing potential of the village is.

The most important object in the area used to be the lead ore mine (Güttler, 2003), but now there are only ruins. The village also used to have: a school, a tavern, the customs bureau and the already mentioned hiking trail Lądek Zdrój – Góra Borówkowa. After rejecting all former directions for development, the village became a small and impoverished settlement unit.

The situation is the same with the Orłowiec village where the population before 1945 amounted to ca. 400 people, at the beginning of the year 1950 it was ca. 150 persons, and nowadays about 85 people, which is less than ½ of the afterwar population. Site investigation conducted in the area shows that the village has been losing its potential. In the past, there were many small farms with one or more buildings, a post office, a customs bureau, a tavern, and a school. Currently there are mostly ruins. The only preserved building is the St. Sebastian Church.

Summing up, the significant changes in the population number, especially the changes between the counts before 1945, after the war, and at the present time are clear symptoms of the decline of features characterizing the village as a specified settlement unit.

2.2. Characteristics of modern management

The detailed analysis of modern management covers the following villages: Lutynia, Wrzosówka, Wójtówka, and Orłowiec. The analysis of Karpno village is limited because of the village devastation; the only preserved objects in the area are tourist walking and bicycle trails. However, it is possible that after providing people with more information about the Lądek Zdrój – Černý Kout border crossing tourists will visit the area more often. Polish tourists will be able to visit not only Uhelná and Javorník in Northern Moravia, but also to use the trail and to go to Javorník, Travná and Zálesí villages and back through the Lutynia – Travná border crossing. There is also the Royal Track (Droga Królewska) where one can admire the unique composition of cultural landscape (Fig. 3).

In the Lutynia village there are two markedly different systems. First are squalid and ruined farms located in the upper part of the settlement unit – see Fig. 4 – cover p. 2 (most of them are holiday houses owned by visitors). The other system includes buildings located in the lower part of the village, owned by residents in the village (mostly unused and deteriorating production buildings). However, a few attempts were made to stop the degradation process – restoration of the St. John of Nepomuk Church built in 1906 and reconstruction of two lodging houses. The aforementioned elements constitute doubtlessly a

Fig. 7: Orłowiec village – eastern side; inhabited farmsteads. (Photo: J. Oleszek)

specific wealth of development. Moreover, while taking into account the existing hiking trail to Wrzosówka, it can be assumed that there is a specific and considerable source of inspiration for the development of tourism in the area. Thus, assuming that further development will follow the requirements of local system, the village degradation can be stopped. Moreover, the village may even preserve the specific features that determine its village status and at the same time retain the qualities of cultural environment (Moschny, 2004).

Another analyzed village is Wrzosówka. Presently there are only a chapel and two holiday houses there (Fig. 5 – cover p. 2).

A problem to resolve in this case is:

- if it is better to accept the existing situation as status quo, to leave the area unchanged, and to encourage tourists to explore it;
- or if it is better to divide the area into parcels and to build holiday houses there.

Certainly, both ideas will have their supporters and opposers. However, the latter idea may have disastrous consequences. Firstly, the amazing atmosphere of the place will be lost for ever. Secondly, the opportunities for tourists to commune with nature will become devalued and then wiped out. Thirdly, the exciting hiking trail from Lutynia to Wrzosówka will turn into an ordinary communication route. And finally, increasing the number of recreation parcels and holiday houses will surely not help to preserve historically formed qualities defining the uniqueness of the area.

Among all analyzed villages in the boundary area, the village of Orłowiec seems to be most interesting. It is located 8 kilometers from Lądek Zdrój near the Różaniec Mountain Pass where on the Czech side there used to be the Růženec settlement. The village lies along the Orliczka mountain stream. Nowadays, the built-up area covers only the bottom of the valley and the south slope with all buildings on the northern slope gradually deteriorating. The arrangement of buildings indicates that Orłowiec used to be a typical village in

Fig. 8: Orłowiec village – currently unused "Orlik" holiday house; an example of architectural inconsistence with the surroundings. (Photo: J. Oleszek)

forest land, on the route to Moravia. After Marianne von Nassau had ordered to build a road from Lądek Zdrój to Złoty Stok and Kamieniec Ząbkowicki, the original arrangement was changed into multistreet village. In 1945, the Różaniec border crossing was closed down and the connections between Orłowiec and Bílá Voda in Czechia were limited. Moreover, it influenced the intensity of the spatial arrangement process to such a measure that some houses were left and later falling into disrepair. At present, all buildings are concentrated in the vicinity of two roads – to Złoty Stok and to Różaniec – and near the St. Sebastian Church. There are also some preserved typical regional farms with inner yards and multi-cubage production buildings combined with houses with unique gate finials, which are however in poor condition – see Fig. 6b. Most of the buildings are used for living; however, their technical state indicates that they have been already fully exploited – see Fig. 7.

Nevertheless, in the village there are also a few objects whose presence enables to support the recreational function of the area, e.g.:

- the currently unused "Orlik" holiday house, whose outline stands out against the local spatial system and local art of building (Fig. 8)
- two agrotourist farms with lodging places (Fig. 6)
- holiday houses of diverse architecture used only in summer (Fig. 9).

However, the location of buildings seems to be problematic because the homogeneous unity of the village has been disrupted. The mere construction of holiday houses may result in a total loss of the village uniqueness and identity. Consequently, the village may turn into a mono-functional settlement hybrid.

3. Summary

The analyzed area is very unique. Studies on modern history prove that before 1945 the analyzed area (extended to Javorník) was inhabited by homogenous population. However, several border crossings in the area and certain interdependence between Polish and Czech villages must have influenced the development of the concerned settlement units. In the late 1940s, an exchange of population occurred with existing inhabitants leaving their houses and many people from other parts of Poland and from abroad settling down in deserted villages. The existing economic and spatial systems seemed strange to the immigrants who did not identify with the place. Further attempts made to develop the area were vague and succeeded only temporarily. Nowadays the area forms a certain kind of incoherent conglomeration. An extreme example may be the decline of Karpno and Wrzosówka villages – if the process is not stopped, the villages will lose all qualities of settlement units and will change into recreation settlements used only by several people. Moreover, the lack of proper control will result in architectural chaos and it is doubtful whether such area will attract any visitors or tourists. Consequently, it is necessary to revitalize the rural settlement units by introducing comprehensive restoration proceedings that would take into account the past stimuli. Also, a detailed analysis is needed of direct and indirect interactions within the diverse functional structure. The existing border crossings in Lutynia and Lądek Zdrój, and the planned border crossing in Orłowiec may give an impulse to the area development. However, the possibility of crossing the border alone is not enough, because there is also a certain useful infrastructure and an information campaign that are needed. Assuming that the main impulse for the development of the area is tourism, both the already existing and the new infrastructure should offer various services to local residents and visitors, and should also correspond to various forms and kinds of tourism.

Fig. 9: Orłowiec village – holiday houses; an example of architectural chaos. (Photo: J. Oleszek)

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THE FIRST TWO "CZECH" MANUALS FOR WEATHER OBSERVATION FROM THE 1ST HALF OF THE 19TH CENTURY

Jan MUNZAR

Summary

The paper introduces two oldest and today half-forgotten "Czech" manuals for weather observation from 1817 and 1827. The author of the first manual was Martin Alois David (1757-1836), a Premonstratensian priest and the fourth director of the Klementinum Observatory in Prague, whose 250th birth anniversary will be commemorated this year. The second manual which was published 10 years later does not state any author but according to the analysis performed by O.Seydl it is undoubtedly his work, too. Although both manuals for weather observation published almost two centuries ago were written in German, they can be considered the first Czech instructions. They were in fact exclusively designed for voluntary observers of the Imperial-Royal Patriotic-Economic Society in Prague at a time when German was still the decisive language of professional publications in the Czech lands, then still part of the Austrian Monarchy. The recent research shows that the 1817 manual was to a great degree grounded on the instructions of J. J. Hemmer (1780) produced for the needs of the Mannheim Meteorological Society (*Societas meteorologica Palatina*). The substantially expanded manual from 1827 already presents, apart from other things, the classification of clouds according to L. Howard.

1. Introduction

It is becoming ever more obvious that just the collection of preserved numerical data from secular meteorological observatories alone is not sufficient for a serious study of climate variation and climatic changes. The so-called "metadata" or information on the history of the specific weather stations and their methodologies of measuring serve as an indispensable complement to them. Without the additional information it would be very difficult to eschew the exact processing of inhomogeneous data.

The current scientific task is the analysis of methods used during past meteorological observations and measurements in order to preclude incorrect interpretations. As the first Czech manuals for meteorology were published between the years 1863-1864, we posed ourselves a question related to this fact: When the first Czech instructions for meteorological observation were actually published?

The first complex manual for climatic observations and measurements used in Bohemia are Latin instructions written by J. J. Hemmer (1780) for the purposes of the collaborators of the Mannheim Meteorological Society (Societas meteorologica Palatina). Between the years 1781 and 1792, the instructions were used by the pioneer of Czech meteorology, Antonín Strnad, for observations at the Prague Observatory which became integrated in the Mannheim network. (The second observatory in the territory of the then Austrian Monarchy participating in this grand international enterprise was Ofen in what is today Budapest.)

On the basis of a performed survey the first instruction available to voluntary observers in the Czech lands was the one published 190 years ago. Its author was Professor Martin Alois David whose 250th birth anniversary will be commemorated this year.

2. M. A. David (1757-1835) and his manual from 1817

This paper does not set itself the objective of providing a detailed history of David's life and work because they are sufficiently known - see e.g. Krška-Šamaj (2001), Seydl (1952, 1957) - should be reminded only that this Premonstratensian priest and the fourth director of the Prague Klementinum Observatory was engaged in astronomy and meteorology chiefly for geodesists and had a special talent for accurate measurements. He did not confine himself only to meteorological measurements in Prague. He can be rightfully considered the pioneer of field measurements which he performed systematically in Bohemia and the neighbouring lands for over 30 years, from 1790 until 1833. Starting with 1817, a network of weather stations was organized due to his merits within the framework of the Imperial-Royal Patriotic-Economic Society with its seat in Prague. The published treatises of this society then included not only the results of measurements from the Klementinum but also climatic summaries from the Czech territory. In the period of David's editorship, the results from years 1817-1829 and 1831 were brought out.

Unified instructions were the necessary assumption for comparable observations. In 1817, David therefore published his brief work in German language on the causes and regulations of why and how to perform meteorological observations (Fig. 1). What does this almost forgotten manual contain?

After a more general introduction into the issue (about the significance of meteorological observations) he moves forward to explaining how and when to measure pressure and air temperature and how to observe changes in the atmosphere and natural phenomena. It is recommended to take measurements three times per day: Temperature of the air in the morning


Urſachen und Vorſchriften,

warum und wie

die Witterungs - Beobachtungen
anzuſtellen ſind;

entworfen

vom Herrn Profeſſor und Aſtronom

Aloys David.

Prag 1817.

Fig. 1: Front page of the manual for weather observations by M. A. David from 1817.

at sunrise, in the afternoon during the warm period at 3 PM (one hour earlier during the cold period) and in the evening at sunset. An important complement to the instrumentation measurements is the observation of the winds – their origin, direction, strength and duration. (The wind strength is categorized into only 4 grades: grade 1 should designate weak winds and grade 4 stands for gales.) The origination, colour, shape and course of the clouds give further evidence of the condition of the atmosphere. It is desirable to record the occurrence of hydro-, litho-, photo- and electrometeors (although David naturally does not use this contemporary terminology). The monitoring of impacts of the weather on animals and plants is also useful.

For today's interpretation of the old records it is important to have an overview of symbols and abbreviations which were used for recording the state of the atmosphere and cloud amount, i.e. the grades of sky coverage by clouds, etc. (Fig. 2). It is obvious that similarly to the assessment of the wind strength in four grades, the symbols were also borrowed from J. J. Hemmer (1780).

We can learn several noteworthy information in the context of David's instructions which expand the hitherto knowledge on meteorology in Bohemia or abroad prior to 1820. One of such information is for example that the measurements of precipitation and snow were then performed only in three locations in Bohemia - Prague, Šťáhlavy and Teplá (the home Premonstratensian monastery of father David), and that it was desirable to enlarge this modest network of precipitation measurements.

Another example is taken from the conclusion of the treatise: "If anybody is interested in a detailed description of all meteorological instruments, he can find them in the meteorological

15

Abkürzungszeichen den Zuſtand der Atmoſphäre zu bezeichnen.

⊙ vollkommen heiter; ⊙ + wenn das Sonnen- und Sternlicht matt und blaß iſt.
= = ganz überzogener Himmel;
=— Größern Theils mit Wolken überzogen;
= Halb heiterer, halb wolkichter Himmel;
—= wenig Wolken; $\frac{o}{o}$ ſehr wenige hin und her zerſtreute.

Farbe, Geſtalt und Größe der Wolken.

al. weiße Wolken.
cin. aſchgraue.
Fasc. längliche Wolken ſammt ihrer Richtung.
l. gelblich oder bleichgelb.
n. ſchwarz; r. roth; sp. dicht;
t. dünne; rup. felſenähnliche.
" Regen. ⧺ Schnee. ∴ Hagel. ∴ Reif.
∴ Nebel; ∴ glac. Froſtnebel.
Regenbogen. ☾ Hof am Monde; ◎ Hof um die Sonne.
⊙——⊙ Nebenſonnen. ☾——☾ Nebenmonde.
♂ Gewitter. AB. Nordlicht.

Fig. 2: Abbreviations and symbols for the phenomena which should be used in the process of recording the weather development according to M. A. David (1817).

works of the canon Stark which are available in the library of the Patriotic-Economic Society. Whom did David mean and which works did he have in mind? If we inspect Hellman's *Repertorium*, there is no doubt that David meant Augustin Stark (1771-1839), a clergyman from Augsburg who is the author of two books included therein. The first book is a series of meteorological almanacs for the years 1810-1834 (published in Augsburg between 1812 and 1836) and the second title is called "Description of Meteorological Instruments with Instructions for Their Use..."(Augsburg, 1814).References to Stark's works also demonstrate how thoroughly David studied the professional foreign literature.

3. Manual for weather observations from 1827

The second manual is a more comprehensive publication of 38 pages and 5 illustrations in the appendix (Fig. 3). It has a rather long title: "Manual for Weather Observations and for Compilation of Agricultural and Forestry Annual Reports from the Imperial-Royal Patriotic-Economic Society for its Observation and Report Filing Members in the Kingdom of Bohemia" (Anleitung 1827).

Anleitung

zu den

Witterungsbeobachtungen

und zur

Verfassung der land- und forstwirthschaftlichen Jahres-Berichte

von der

k. k. patriotisch-ökonomischen Gesellschaft

für ihre

beobachtenden und berichterstattenden Mitglieder

im

Königreiche Böhmen.

Mit fünf Abbildungen in Stein

Prag, 1827.

Gedruckt bei Gottlieb Haase Söhne.

Fig. 3: Front page of the manual for weather observations from 1827 the author of which was very likely also M. A. David (Anleitung 1827).

A brief introduction is followed by the longest I. part named "Manual for Meteorological Observations" (pages 5-21). It first provides a short overview of meteorological elements and phenomena which need to be measured and monitored and it then introduces the characterization of a barometer, thermometer and precipitation gauge together with instructions how they should be treated. (The list of abbreviations and symbols for recording the observed atmospheric phenomena is however absent because it was probably assumed

that the observers also had David's manual published ten years earlier at their disposal. As a matter of fact, there is a small reference to the instructions from 1817 in the text.)

The first part is followed by a section addressing the observation of the winds and forms and classification of clouds according to L. Howard which is a significant contribution compared to the 1817 manual. The chapter mentions 7 types (forms) in total: Mainly the three basic types (*Cirrus*, *Cumulus* and *Stratus*) and then 4 "intermediate shapes" of *Cirrocumulus*, *Cirrostratus*, *Cumulostratus* (presently referred to as *Stratocumulus*) and *Nimbus*. Description of the individual types of clouds is very elaborate and complemented by five illustrations (lithographies). The individual pictures also run captions explaining all the depicted types of clouds. (E.g. figure 1 shows *cumuli* together with *cirri*.) The chapter dealing with clouds is supplemented by the following footnote: "If anybody wishes to see a more detailed classification of clouds, he can refer to the publication *Research into Clouds and Other Atmospheric Phenomena* (Leipzig, Baumgartnerschen Buchhandlung, 1819)."

The second part (pages 22-34) includes the "Manual for Compilation of Economic Reports" concerning agricultural economy, cattle breeding, fish farming, beekeeping, growing of fruit, wine and hops. The subchapter titled "harvest yields" should also briefly mention the weather in every month in relation to the individual phenological phases.

The concluding third part (pages 35-38) contains the "Manual for Compilation of Forestry Reports." It includes 16 principal questions which should be answered together with 15 subquestions in the annual report.

The reason why Prof. M. A. David was not mentioned as the author or co-author of these instructions will however probably remain unknown. Perhaps it had to do with the then rivalry between the functionaries of the Imperial-Royal Patriotic-Economic Society in Prague.

4. Conclusion

Although the two David's manuals for weather observation published in the 1st half of the 19th century were written in German, they can be considered as the first Czech instructions because they were intended exclusively for voluntary observers from the Imperial-Royal Patriotic-Economic Society in Prague at a time when German was still the dominant language in the Czech lands, then part of the Austrian Monarchy.

The German language continued to be used in the meteorological instructions even after the establishment of the Central Institute for Meteorology and Land Magnetism in Vienna in 1851. It is interesting that the author of the first of these instructions from 1850 was Carl Kreil (1798-1862) who, similarly as M. A. David, worked in the Klementinum Observatory in the years 1838-1850. In 1845, he was appointed its director and nominated professor of astronomy at Charles University from the position of a scientific personality of world significance and an excellent organizer. In 1851, when he was appointed the first director of the new meteorological institute with a field of activity covering the whole of Austria, he moved to Vienna together with his two colleagues. But the aforementioned manual (Fig. 4) still refers him as the director of the Imperial-Royal University Observatory in Prague and a regular member of the Imperial Academy of Sciences (Kreil, 1850).

The first literally Czech manual for weather observation is associated with the foundation of Czechoslovakia in 1918 and the State Meteorological Institute in Prague (Gregor, 1920).

Entwurf

eines

meteorologischen Beobachtungs-Systems

für die

österreichische Monarchie.

Mit 15 Tafeln.

Nebst einem Anhange

enthaltend

die Beschreibung der an der k. k. Sternwarte zu Prag aufgestellten Autographen - Instrumente:

Windfahne, Winddruckmesser, Regen- und Schneemesser.

Mit 2 Tafeln.

Von

CARL KREIL,

Director der k. k. Universitäts-Sternwarte zu Prag, wirklichem Mitgliede der kaiserlichen Akademie der Wissenschaften etc.

Wien, 1850.

Aus der kaiserlich-königlichen Hof- und Staatsdruckerei.

Fig. 4: Front page of the "Proposal for the System of Meteorological Observations for the Austrian Monarchy" by Carl Kreil (1850).

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REVIEW

Karel KIRCHNER

GOUDIE, A.S., KALVODA, J., eds. (2007): Geomorphologic Variations. P3K Publishers, Prague 2007, 407 pp.

The publication presents results of 15 years of research collaboration between geomorphologists of Oxford University (School of Geography in the Centre for the Environment) and of the Department of Physical Geography and Geoecology of the Faculty of Science, Charles University in Prague. The publication further contributes to the major anniversary commemorated in 2006 – 150 years of geography at Charles University. The monograph includes 18 contributions by geomorphologists of the abovementioned sites and their colleagues. As this review does not provide space to deal with all of the articles I will only focus on a few selected studies containing fundamental methodological or factual contributions to research into and knowledge of relief and process dynamics.

Special attention is deserved by the opening contribution by A. S. Goudie and J. Kalvoda "Variable Faces of Present–Day Geomorphology". The article offers a rudimentary insight into the history of geography at Charles University and its links to English geography. Proper attention is paid to J. V. Daneš, the founder of Czech geomorphology, and his relevance for further development of Czech and Slovak geomorphology. Contributions by other geomorphologists to the history of geomorphology also include the significant achievement of J. Kunský. This section might have included more representatives of geomorphology at Charles University with outstanding achievements (such as J. Moschelesová, V. Dědina). The section devoted to geomorphology at Charles University is concluded with a presentation of the principal research trends at the Department of Physical Geography and Geoecology: i) Landform evolution in relation to global environmental changes in late Cainozoic, ii) Measurements and monitoring of recent geomorphologic processes and events, iii) Geomorphologic studies in selected regions of Europe, Asia and Latin America, iv) Natural risks and hazards. It may be stated that the abovementioned basic trends at the same time correspond to the structure of the contributions represented by the works by the Charles University researchers. Appropriate attention is also paid to history of geomorphology at Oxford University, producing a number of excellent geomorphologists, active virtually across the world, both in the past and at present. The Oxford site focuses on a wide spectrum of issues from theory to applied environmental geomorphology. In the conclusion to the contribution the authors stress the specifics of the published articles representing conceptual approaches of both sites. The geomorphologists of Oxford and their colleagues focus more on regional and general studies emphasizing achieved results of strong global changes in relation to the natural environment. The studies presented by geomorphologists of Charles University in Prague and their colleagues focus on case studies of landform changes or regional aspects of Quaternary landform evolution. The contribution represents a broader impact on Czech geomorphology, as it shows trends and relevant issues of global geomorphology, thus allowing for their comparison with the published contributions.

The methodologically inspiring contributions include the article by B. Hickley and A. S. Goudie "The use of TOMS and MODIS to Identify Dust Storm Source Areas: the Tokar Delta (Sudan) and Seistan Basin (South West Asia)". The authors used two means of remote sensing for identification of storm sources on the Northern Hemisphere. MODIS (Moderate Imaging Spectroradiometer) is part of the earth observation system (EOS) on the Terra and the Aqua satellites. Its high spatial and spectral resolution allows for visualisation of dust in the atmosphere above the ground and the water surface and specification of source areas of dust activity. TOMS (Total ozone mapping spectrometer) is installed on the Nimbus 7 satellite and is based on the principle of detection of dust particles with the help of UV spectrum. Using the above mentioned materials of remote sensing the authors found two main sources of dust

particles for dust storms: the Seistan Basin in the border region between Iran and Afghanistan and the Tokar River Delta on the Red Sea coast in Sudan.

The especially valuable regional contributions include studies of various types of mountain relief in different climatic conditions of South America and Central Asia. The contribution by J. Kalvoda and A. S. Goudie "Landform Evolution in the Nagar Region, Hispar Mustagh, Karakoram" makes use of long-term experience (including field experience) of both authors in the region of interest. In the Nagar region of Hispar Mustagh Karakoram the morphotectonic processes are combined with intense denudation and erosion in the changing Quaternary paleo-climatic conditions.

The article "Intensity of Weathering as a Relative Exposure Age Indicator of Mass Movements at Machu Picchu" by H. Viles, V. Vilímek, R. Přikryl, J. Zvelebil includes basic results of geomorphologic studies carried out at the unique archaeological locality of Machu Picchu in Peru, disturbed by slope movements. The purpose of the study was recent history of landslides on the basis of the granitic rocks weathering.

Another motivating contribution also for evaluations under our landscape conditions, is represented by the strongly synthesizing article by A. G. Parker and A. S. Goudie "Late Quaternary Environmental Change in the Limestone Regions of Britain", dealing with changes of the natural environment (especially relief) in the Upper Quaternary (in the past 18,000 years) in the limestone regions of Great Britain. The authors characterise the individual periods with regard to climate, vegetation, type of geomorphologic processes and human activities.

Contributions to the issue of soil erosion and possibilities of its assessment include the study by J. Boardman "Soil Erosion: the Challenge of Assessing Variation through Space and Time", presenting complexity of the issue of evaluating soil erosion with regard to both temporal and spatial criteria. Practical achievements of the study of erosion processes from the regional perspective are presented by the collective of authors Z. Kliment, J. Langhammer, J. Kadlec in the article "The Suspended Load and Soil Erosion Processes in Mesoscale Catchment Areas". The article focuses on research into alluvial deposits in medium-sized catchment basins (the Blanice, the Loučka, the Lužická Nisa and the Olšava).

Five articles show strong regional focus on various aspects of geomorphologic evolution, modelling processes and diversity of forms in the Sudeten mountain ranges in our country and in Poland. Main gestors of the contribution are geomorphologists of Charles University, in cooperation with colleagues from Oxford and Wroclaw Universities. The set of case studies represents a significant progress in the geomorphologic study of the concerned region. I would also like to point out the study by S. Carr, Z. Engel, J. Kalvoda, A. Parker "Towards a Revised Model of Quaternary Mountain Glaciation in the Krkonoše Mountains, Czech Republic". The contribution offers new views of the issue of glaciation of the Krkonoše Mts., including documents of Late Weichselian glaciation of the Obří důl Trough, the extensive Weichselian glaciation of the Úpa valley and the Pre- Weichselian glaciation of the Mladé Buky area.

A good contribution to the development of methodology and facts of geomorphology is also represented by the article by A. Placek, P. Migoń "Rock-Landform Relationships in the Sudetes in the Light of Rock Strength Assessment Using the Schmidt Hammer", for Schmidt hammer begins to be extensively used in our geomorphologic research too (for example in the České středohoří Mts. - Middle Mountains or in the Moravskoslezské Beskydy Mts. - Moravian-Silesian Beskids). Rock resistance was studied in the Polish Sudetes in 29 types of rock and 589 localities.

Valuable additional knowledge on the Sudetes is provided by the article entitled "Periglacial Landforms above the Alpine Timberline in the High Sudetes" by M. Křížek, dealing in great detail with various periglacial forms (such as tors, frost-riven cliffs, cryoplanation terraces, block fields and streams, nivation hollows, patterned ground, ploughing rock blocks, solifluction lobes and terraces), situated above the Alpine timberline boundary in the Krkonoše Mts., the

Hrubý Jeseník Mts. and on the Králický Sněžník Mts. The contribution represents a significant progress in the knowledge of periglacial forms in the regions of interest.

The publication ends with the contribution by J. Kalvoda "Morphostructural Evolution of the Relief in the Locality of the Geodynamic Observatory at Pecný, the Ondřejovská vrchovina Highland, Czech Republic". The contribution shows a considerably broader focus and appears rather synthetic. The study deals with the morphostructural evolution of the central part of the Bohemian Massif from the Precambrium to the Mesozoic, pointing out the principal tectonic development stages. The article characterises in detail the relief evolution in the Cainozoic with a special focus on detail in the surroundings of the Geodesic Observatory at Pecný in the Ondřejovská vrchovina Highlands (tectonics, planation surfaces, river terraces). The factual value of the contribution is high and its relevance for knowledge of geomorphologic evolution of the central part of the Bohemian Massif is fundamental.

The reviewed publication summarises current results of cooperation between geomorphologists of Charles University in Prague and Oxford University and their colleagues. The editorial contribution of Professors A.S. Goudie and J. Kalvoda must be appreciated together with their authorial share in a number of the published articles. The publication brings a lot of new information about relief evolution in different regions and climato-morphogenetic areas, introducing the use of a wide range of research methods including untraditional ones. The book will certainly meet with a positive response on the part of the Czech geomorphologic community.

REGIONS, LOCALITIES AND LANDSCAPES IN THE NEW EUROPE

International Geographical Conference CONGEO´2007

Bohumil FRANTÁL, Eva KALLABOVÁ, Petr KLUSÁČEK

It was the 7th follow-up of geographical conferences organized since 1995 by the Department of Environmental Geography, Institute of Geonics (Brno branch), Academy of Sciences of the Czech Republic, every odd year, which continued the tradition of biennial international meetings of geographers and other scientists engaged in regional problems. This time (August 27-31), accidentally in the year of the 25th anniversary of the Institute of Geonics' selfcontained existence, the conference came back to the heart of Moravia, to Brno.

Since the very beginning the aim of the conferences has been to intensify international collaboration in regional research, to support international relations and to improve awareness of scientific public about the recent research achievements of geographical workplaces. The topics have always reflected actual problems and current trends on a wide scale. This year, geographers and other experts in social sciences from the Czech Republic, Austria, Germany, Hungary, Poland, Latvia, Romania, Spain, Norway and Canada participated at the conference and over 20 lectures dealing with various partial disciplines of geography were presented during the two conference days. Individual papers were focused on issues thematically reflecting the proposed themes: Regional Economy and Policy in the Integrating Europe, Regionalisation and Cross-border Cooperation, Changes of Society in Urban and Rural Context, Human Impacts on Landscape and Environment from the Regional Perspective, and Landscape Planning and Environment Protection.

Most of the presented papers raised interest of all participants as their themes are topical and common in all European countries. The ensuing excited discussion was launched by the talk of Assoc. Prof. Jerzy Banski (Institute of Geography and Spatial Organization, Polish Academy of Sciences) who presented the common key notes of his own paper and the one of Dr. Margit Werner (Sweden) discussing some inciting questions of the present „border between Western and Eastern Europe" and the East-Central Europe region concept. Other lively discussions followed after the contributions of Mgr. Petr Klusáček (Institute of Geonics, Czech Academy of Sciences) dealing with the problems of territorial public administration reform in the Czech Republic and its consequences, and the one of Prof. Walter Matznetter (University of Wien, Austria) concerning the issue of transnational student mobility (paper based on the research results from the narrative interviews with students from five European countries). All lectures were published as fulltexts and/or in the form of enhanced abstracts in the conference proceedings [1].

The conference participants were offered to join in a guided excursion which was to make them acquainted with some prominent places of the administrative regions of South Moravia and Vysočina. They were informed about the history and the present of the Moravian capital - Brno, they visited the Tugendhat Villa (one of the most important functionalist buildings of the European period of architect Ludwig Mies van der Rohe, listed in the UNESCO heritage), the Brno dam-lake, and the Masaryk racing circle (place of the world championship in motorbike racing - Grand Prix). Other excursion stops included the city of Třebíč (formerly known especially for its shoemaking industry, today rather priding itself of historical monuments - a well-preserved ensemble of the Jewish Quarter and the Basilica of Saint Prokop that provides a unique example of the close connection between Christian and Jewish cultures

[1] Kallabová, E., Frantál, B., Klusáček, P. (eds.) (2007): Regions, Localities and Landscapes in the New Europe. Institute of Geonics AS CR, v.v.i., Brno. 73 pp + CD ROM. ISBN: 978-80-86407-24-1.

from the medieval times till the 20th century – listed in the UNESCO world's heritage), the Czech famous Dalešice brewery, and the Dukovany nuclear power station (built as the first one in the Czech Republic).

During the whole conference meetings the significance and the future of CONGEO was a hot theme in discussions. As Prof. Bryn Greer-Wootten (University of York, Canada), one of traditional CONGEO participants, pointed out concisely in his thankful oration at the closing dinner party, that CONGEO is a conference quite different from most other academic gatherings because it is relatively smaller concerning the number of participants (compared the hundreds or more at other international venues) so the participants can coalesce in a quite intimate milieu; the conference has one program, rather than a series of specialized sub-group meetings held concurrently (what potentially leads to a greater level of intra-disciplinary fragmentation and seclusion between persons as representatives of particular geographical disciplines); and last but not least, we could see (especially this year, but growing in importance every two years) an increased role and participation of younger scholars what is surely a promising aspect for the future.

The denominators of CONGEO have become collaboration, cooperation, communication, and understanding as most of the participants agreed. So we have the honor to pay homage to all participants (to occasional visitors as well as to others with relatively continual membership) and to thank all colleagues who were engaged in the organizational acitivities for their contribution to the success of this conference. We thank also to all people who were concerned with the CONGEO in the past for making the conference spirit so valuable and meaningful. Long may it live in our memories, long may it continue into the future. See you all at CONGEO 2009!

Fig. 1: The conference participants during a meeting

Fig. 10: Crofts – small private plots. *(Photo M. Flekalová)*

Fig. 13: Almond trees in blow *(Photo: authors)*

Illustrations related to the paper by M. Flekalová and P. Trnka

Fig. 3: View from the Liščí vrch Hill to the Pavlovské vrchy Hills (from the north across the Hustopeče cadastral area). *(Photo M. Flekalová)*

Fig. 9: View of the Pavlovské vrchy Hills from Road N. 420 - two km south of Hustopeče. *(Photo M. Flekalová)*

Fig. 11: Landscape in Unit 2 – The Gate of Hustopeče. *(Photo M. Flekalová)*

Illustrations related to the paper by M. Flekalová and P. Trnka