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IRSE: Mining heritage of Central Europe and its protection

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AND GEOHERITAGE ATTRACTIONS

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Edited by: Ľubomír Štrba

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CONTENTS

NEW ELEMENTS OF GEODIVERSITY OF SUDETY MTS. (SW POLAND) – RESULTS OF GEOLOGICAL MAPPING OF OLD MINING UNDERGROUND WORKINGS

Paweł P. Zagożdżon & Katarzyna D. Zagożdżon
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ABSTRACT
Geological mapping of old underground mining workings increase the geodiversity of a region. Such studies document the geological phenomena and structures not avalaible on the surface area. It can be very well illustrated by the example of Sudet Mts. – a geologically complicated range in SW part of Poland. Four geological plans were shown, made for: Upper Adit in Kowary (on the old mine "Freedom" mining field), Gertruda adit in Zloty Stok, a small adit in Janowice Wielkie and Osówka object (element of Nazi military complex "Riese"). The examples of interesting phenomena like important contact zones of lithological units, rare occurances of vein rocks and well exposed faults were discussed.

Keywords: geodiversity, geological mapping, Sudety Mts.

INTRODUCTION

Sudety is a complex mountain range located in SW Poland. This area is known as this part of the country, which has the most complicated geological structure, called "mosaic-structure". Particular tectonic bloks show a different geology in terms of petrology and mineralogy, stratigraphy and age, tectonic derformations and type of mineral deposits. Therefore Sudety Mts. are an area of high level of geodiversity, important for geotourism. At each site, even close to each other, you can observe a completely different geology.

Elements of geodiversity are very well visible on the surface of the earth, but Sudety in this field also have enormous, unusual potential of underground objects. We mean the old underground mining workings, which occur here in large numbers and diversity.

These objects (both available for tourists, as well as not adapted for sightseeing) are the subject of scientific research. Such studies relate to issues of biological disciplines or are the basic mapping studies (see several articles on [9]). In the field of earth sciences e.g. the mineralogical works are performed (see: [4, 7]). Basic geological works including geological mapping of such excavations are rarely carried out. Currently, in the Sudety area, research of this kind are carried out only by staff of the Institute of Mining, Wroclaw University of Technology (eg [6, 10, 12, 15–17]).

The study includes a detailed, long-term field work, characteristics of rock types, description of mineralization, characteristics of tectonic phenomena, and finally, on this basis – a generation of a geological plan.

The paper shows briefly the results of geological mapping in selected old underground objects important as the geosites (fig. 1).

Fig. 1 Location of sites described in text.

UPPER KOWARY, "WOLNOŚĆ" MINE

Several historic mining workings were penetrated in the Upper Kowary (germ. Schmiedeberg), on the field of "Wolność" ("Freedom") mine [10, 11, 12, 14]. This city is known as a center of iron ore and uranium ore and fluorite exploitation. For over six centuries many mining workings were created in area of Upper Kowary ("Wolność" – "Freedom" mine, german "Freihait") and neighboring Podgórze village ("Liczyrzepa" – "Rübezahl" and "Podgórze" mines).

So-called Upper Adit, located in eastern mining field of "Wolność" mine, has been investigated in detail, its geological plan was made on a scale of 1:1000 (fig. 2).

The most important structure described in this adit is a contact surface of granitoid Karkonosze massif and its eastern metamorphic cover (fig. 3). Perfectly visible is variability of a granite in zone close to the contact. We can distinguish coarse-grained, porphyroceaous granite in a distance of over 50 m from the contact, thin-grained porphyroceaous granite and narrow zone of various thin-grained granites adjacent to the contact. The biotite streaks and enclavas occure in coarse-grained granite. A number of rocks of the Podgórze ore-bearing formation were described, such as: hornfels varieties, as well as marble and skarn.

In this adit occur dislocation zones of various orientation. Within the metamorphic complex the presence of several blocks of different tectonic foliation and type of fold deformations was documented. In one of the vein rocks (fine-grained granite) an interesting set of indicators of magma flow direction was described [13] (fig. 4).

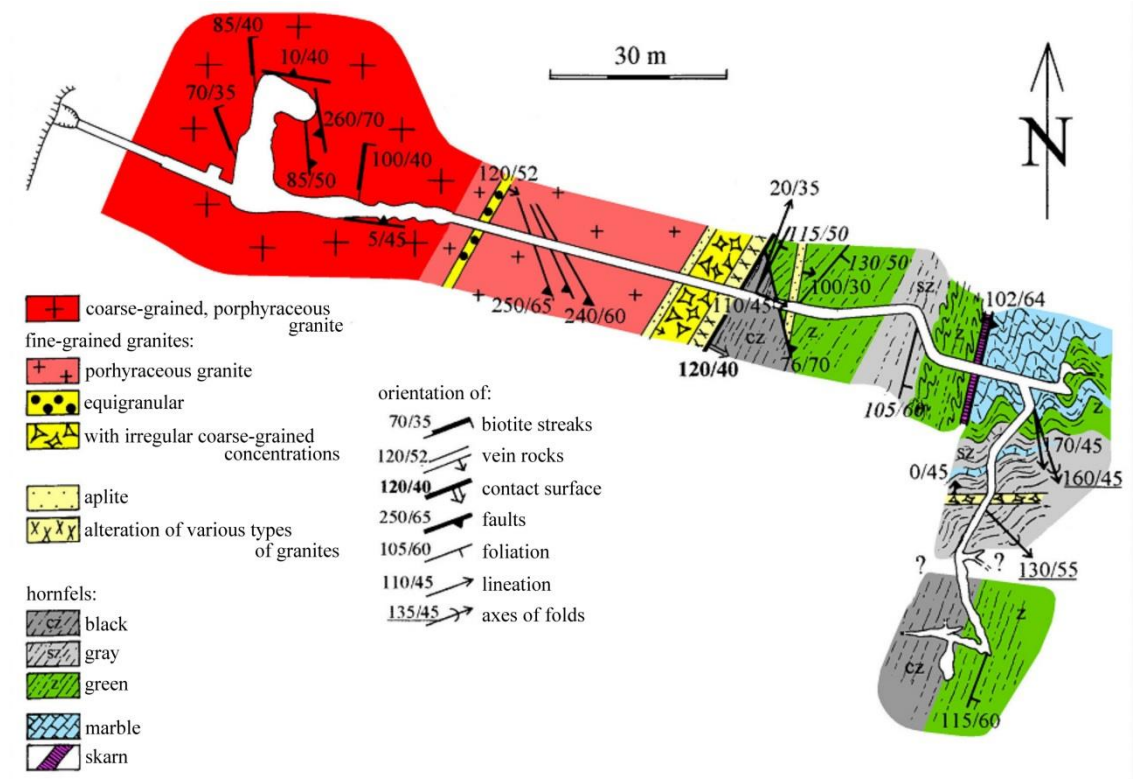

Fig. 2 Geological plan of Upper Adit in Kowary (after [11]).

Fig. 3 A precise view of the contact zone of Karkonosze granite and hornfels.

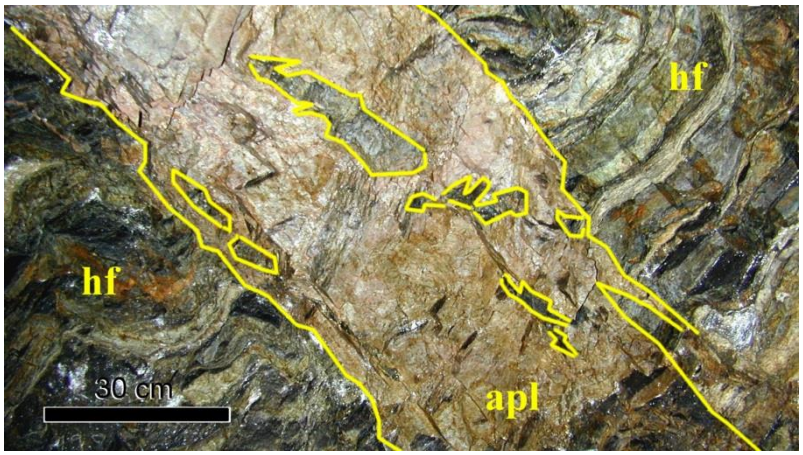

Fig. 4 Indicators of flow direction in aplite vein (apl) cutting a hornfels complex (hf) [13].

ZŁOTY STOK

Zloty Stok (germ. Reichenstein) is one of the most famous historic mining cities in Poland. Perhaps since the sixth or seventh century gold mining was carried out here. The first documents confirming the mining activities are known from the thirteenth century. Since the beginning of the eighteenth century an intensive extraction of arsenic ores started. Mining activity has been completed in 1961.

Geodiversity of Zloty Stok area is shown in the example of a tourist underground route “Gold Mine in Zloty Stok”. Geology of three adits of this mine is imaged on precise plans, these are: Gertruda adit, Czarna Górna (Upper Black) adit and Czarna Dolna (Lower Black) adit. Preliminary work has been done as part of the diploma thesis [5]. In 2010, detailed geological plans and the proposed geotouristic route were presented in a paper [16].

The mine is located in an area of complicated geological structure, so-called Zloty Stok–Skrzynka dislocation zone. There is a number of lithological varieties of metamorphic rocks there, which were formed in several phases of regional and dynamic metamorphism [8].

In adits avalaible as a tourist route, the basic lithological types of Złoty Stok deposit are visible, these are mostly blastomylonitic mica schists and leptites, less frequently dolomitic

marbles and serpentinites and rarely – pegmatites and tectonites. Outside the tourist route it is possible to observe *in situ* löllingite mineralization.

An interesting, possible to trace, phenomenon is here a variability of orientation of rock foliation. Analysis of the cartographic view lets you indicate a range of large-scale fold deformations (fig. 5). On the side walls of excavations different smaller folds are also visible – these are broad and isoclinal, disharmonic and intra-foliation folds [16, 17].

Mining workings in Złoty Stok allow to observe several faults and wider zones of dislocations. Biggest of them are large deformation zones with a thickness of up to several meters (fig. 6a), with bands of irregular surfaces of displacement and plenty of fault meal. These zones were created in a various physical conditions – from ductile to completely brittle, what indicates the different time of their creation. Minor faults have very variable amplitude, thickness of displacement zones, orientation, and the character of the surface (fig. 6b). Available to watch are, among others, polished surfaces, fault striae and reorientation of foliation at the faults. Within the above-mentioned broad zones of dislocation bands of small secondary faults are visible. [16]

An interesting group of tectonic phenomena may be observed in the northern part of the upper level tunnel of Gertruda adit. This is a complex of faults with amplitude of about 1 m, with perfectly visible reorientation of rocks foliation close to the fault surfaces. They limit a tectonic block elevated in compressional regime and deformed into an anticline [16].

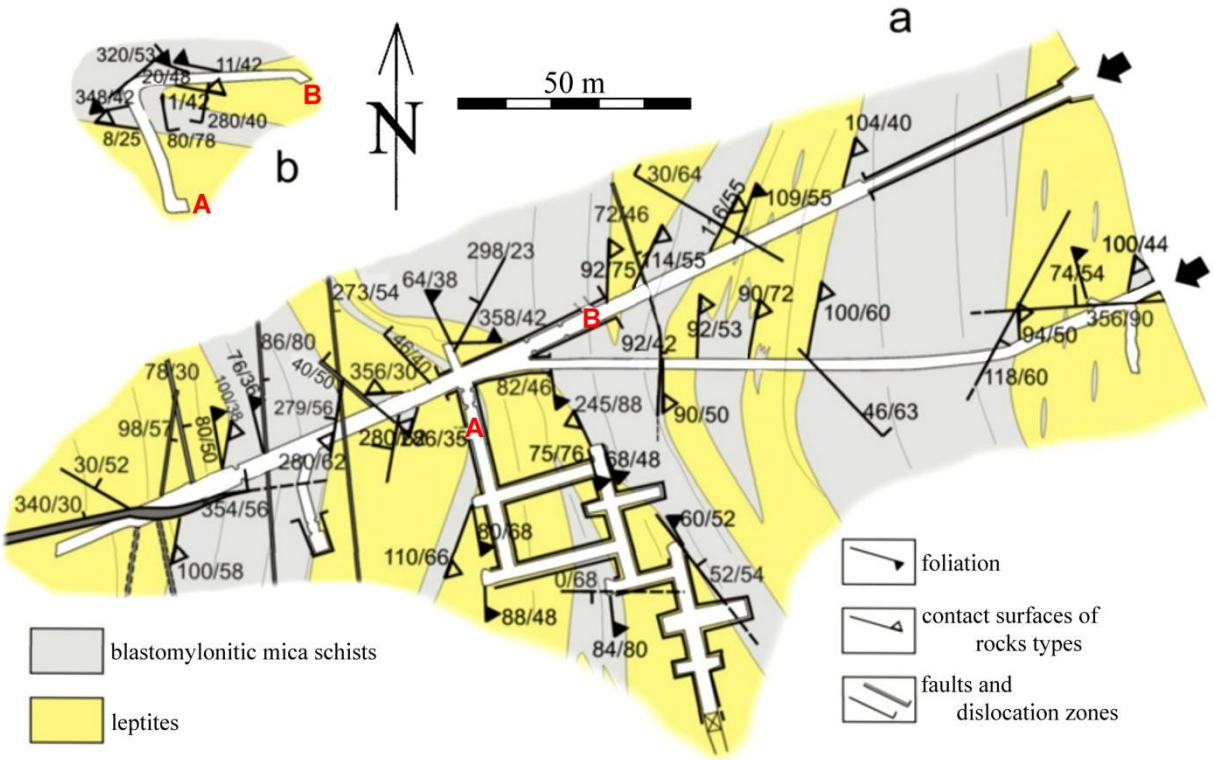

Fig. 5 Geological plan of Gertruda Adit (a) and upper level (b) (after [16]).

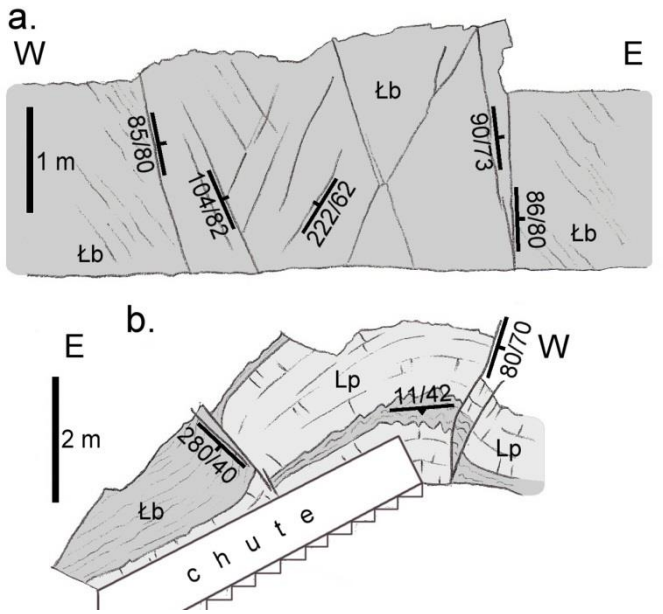

Fig. 6 Examples of faults in underground tourist rout in Zloty Stok, a – broad dislocation zone with secondary faults, b – a set of faults and fold structures; Łb – blastomylonitic schists, Lp – leptites (after [17]).

OSÓWKA

"Osówka" is a large object arose during World War II as part of Nazi military complex called "Riese". It is a set of intersecting corridors and halls, with two entrance adits (fig. 7). The total length of corridors reaches 1700 m. Their regular, orthogonal system provides a unique opportunity to track the variability of geological structures. "Osówka" is situated in the Sowie Mts. Massif. The dominant varieties of rocks in this unit are structurally diverse, highly metamorphosed paragneisses. Their protolith was built during the Late Riphean – (maybe) Middle Cambrian [2], and the maximum intensity of metamorphic processes occurred in the period 384–370 million years ago [18].

The main type of rock in "Osówka" is a monotonous, gray, medium-blastic gneiss with constant orientation of foliation around 45/80. Dark, fine-blastic or aphanitic gneisses, transition varieties of gneisses and highly shattered migmatitic gneiss, occurring near the larger zones of dislocation, are clearly in the minority [6].

A more interesting group of rocks are here igneous rocks – reomorphic granites occurring in veins, lenses and nests. Three structural varieties of these rocks were described here. You can also observe the occurence of pegmatite. An interesting phenomenon are clusters of granite veins ("swarms" of veins) occurring near to the entrance of adit No 1 (fig. 7, 8). In some places these veins are clearly boudinaged [6, 17]. Such a scale of these structures is not to be seen anywere else in the Sowie Mts. Massif.

ADIT IN JANOWICE WIELKIE

The last of objects discussed is a small, unknown in the older literature, adit located in the southern part of Kaczawa Mts. Its length is about 140 m, in the final part there is a large chamber work (fig. 9) [15].

This area is mostly built of greenstones with greenstone-schists and lenses of marbles (crystalline limestone). These rocks represent the oldest part of Kaczawa Metamorphic Unit. Age of protolith (basalts, basaltic tuffites and limy mud) shall be determined on the Middle Cambrian – Lower Ordovician [1, 3]. The adit is located in the close vicinity of the most important dislocation zone in Sudety Mts. – the Intra-Sudetic fault zone.

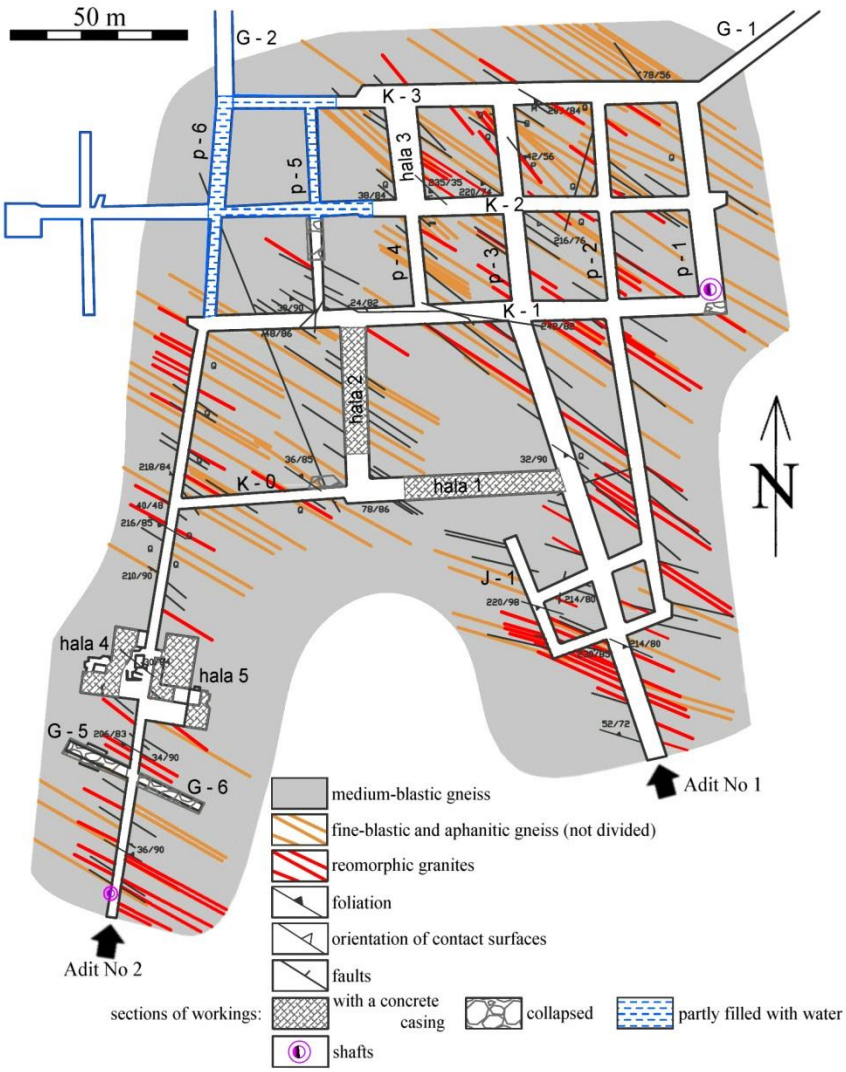

Fig. 7 Geological map of the tourist rout in „Osówka" object; the occurrences of quartz (Q), pegmatite (P) and secondary mineralization (M) are marked; description of mining workings: K – halls, G, J, p – drifts) (after [6]).

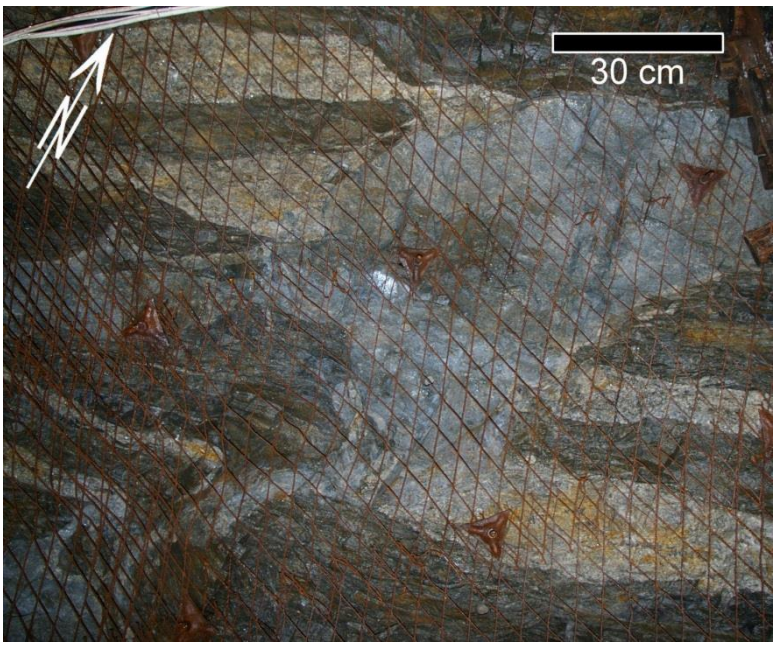

Fig. 8 Veins of reomorphic granites in Osówka (after [17]; view on a roof).

In the adit dominates monotonous greenstone but there is also an approximately 30-meters-long lens of marble here. The internal variability and lithological boundaries of marble are perfectly visible (fig. 9, 10) [15]. The occurrence of number of faults, with the two largest, probably genetically related to the Intra-Sudetic fault zone, was ascertained.

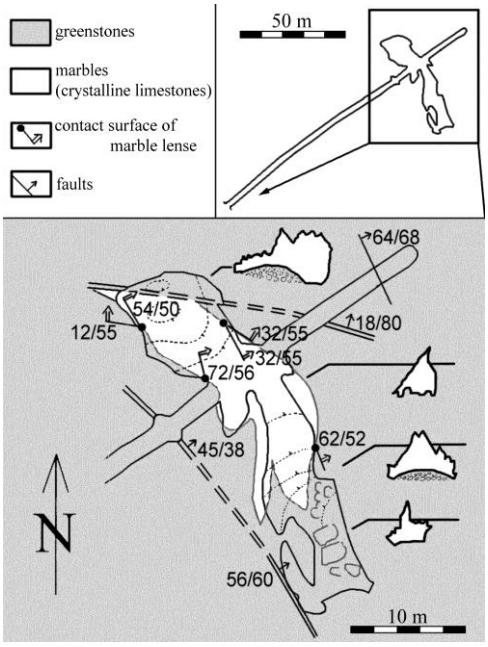

Fig. 9 Geological plan of adit in Janowice Wielkie [15]

Fig. 10 Internal variability of marble and its contact with greenstone.

CONCLUSIONS

Detailed geological investigations of old undergroud mining workings allow precise description of various geological phenomena and structures. In the temperate climate many of such phenomena are poorly accesible or absolutely not visible on the surface of earth. Therefore discussed underground objects significantly enhance the geodiversity of the region of Sudety Mts. A number of such underground facilities will be proposed as geological documentation sites.

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ASSESSMENT OF GEOTOURISM AND TOURISM DEVELOPMENT IMPACT IN THE AREA OF ZÁDIEL AND HÁJ VILLAGES

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ABSTRACT
One of the challenges of the development of rural tourism is the minimization of the impact of tourism on the culture and social framework of villages. In geotourist context it is also the minimization of the impact of tourism on the natural resources. An increase of the proportion of income of the villagers coming from tourism as opposed to the traditional income source (agriculture, fishing, etc.) would make the rural economy vulnerable to variations in tourism intensity. The paper deals with the impact of tourism on the villages in the vicinity of the Zádiel and Háj gorge (E. Slovakia) and their surrounding. Both are popular geotourist sites situated in the Slovak Karst National Park. Zádiel is a small village at the entrance to the Zádiel gorge. The gorge is passable only on foot. It used to be a solely agricultural village. Presently it is exploiting also the fact that the number of tourists travelling to the gorge is increasing and is offering basic tourist services to visitors. The view of villagers on tourism development was investigated through surveys. Háj has a similar position regarding the Háj gorge. The difference between the two villages is that there is a state road going through the Háj gorge and thus it is not a terminal place for visitors on motor vehicles. A form of tourism that is getting popularity in this area is temporary residency of people from greater cities, who buy there houses as weekend residences. This initiates changes in the cultural profile and professional structure of the village. It was found that the population of the villages is divided as regards the positive or negative impact of tourism. One part is willing to adjust or has adjusted to the needs of tourists by offering hospitality services, the other part would prefer to maintain the status of an agricultural village. The prevailing view depends also on the personal and political affiliation of the Mayor and of the local government. The paper also indicates the ways of a calibration of tourist capacity and LAC.

INTRODUCTION

Geotourism is a relatively new form of tourism, even if its basic features were known for centuries. Geotourism has a number of definitions (e.g. Buckley. 2003, Hose 2008, Newsome, Dowling, 2010, Nekouie-Sadry, 2009) and basically it is understood either as a form of tourism where the primary object of interest is the landscape and geology, or as a form of eco-tourism. In our case the first definition is considered.

In order to develop geotourism it is necessary to have an interesting locality or area and then the related conditions and services (trail design, marking and management, implemented environmental protection measures, lodging and catering facilities, human resources available for auxiliary services and programmes, support of the local government and community, etc.).

As it can be seen from Fig.1. both Zádiel and Háj are situated next to the Slovak Karst National Park - at the entrance of two exquisite gorges. The Zádiel gorge is a National Protected Area since 1954.

An analysis of different environmental loads related to tourism in Zádiel is given in Jurkasová (2009). The relevant data on environmental load in Zádiel are given in Tab.1. Measurements and modelling of air pollution in the Zádiel area (Carach 2010) has shown that in spite of the closeness to a national road with heavy traffic, to the nearby open pit mines and cement factory, the air pollution level is below the liming values for PM_{10}.

The Zádiel and Háj gorges are frequented by geotourists due to their unique features (karst plateau, gorges, waterfalls, caves, archaeological sites, climbing sites, etc.; cf. Bárta 1977, Tóthová 2003). Other activities like cyclotouring or paragliding are also possible here.

Zádiel and Háj have a long history of development. They both were first mentioned in the 14th Century. They are up to the present day agricultural villages with a developing rural tourism and geotourism portfolio. Both villages have tourist lodging facilities and have various festivals, like workshops for rural skills. The villages are a starting point for a

number of tourist activities (cf. Timcak 2013). They offer both object related and activity related authenticity (Wang 1999).

Fig.1 Map of the studied area (Source: Google maps).

The number of visitors fluctuates during the year, and the available surveys are sporadic. Tab.2. shows the counted and estimated values of visitor numbers for 2006, 2007 and 2009.

Tab. 1 The tourism related environmental load in Zádiel (Jurkasová 2009)

Type of load	Environemntal load	Evaluated period (2009)
Traffic related load	Vehicles with petrol engines: •CO= 2032,8g •NOx= 122g •PM= 10,2g Vehicles with diesel engines: •CO= 1016,4g •NOx= 542g •PM= 10,2g	April to September
Load related to lodging services	534,5 kWH of electrical energy per month and 308 l of water per visitor and day.	Per month and per day
Noise related load	cca 80 dB during tourist visits and per tourist pair	All the year round
Litter quantity relater to tourism	cca 8470 plastic bottles and the same amount of other packing materials	April till September

Tab. 2 Visitor numbers in the Zádiel area
(Source: Kováčová 2007, http://www.vsmuzeum.sk/projekty/prieskum-zadiel, Jurkasová 2009)

No. of visitors[1]	**2006**	**2007**	**2009**
Visitors per day (Easter Monday)	1264		
Estimated visitors per year[2]	28000		
Visitors per day (1st May)		792	
Estimated visitors per year		17540	
Visitors per day (1st September)			1056
Estimated visitors per year			23390

It can be seen from Tab.3 that the majority of the visitors come for trekking through the Zádiel gorge. The preferred mode of transport is by cars (70%) and train comes last, even though there is a train stop in Dvorníky (adjacent village to Zádiel). The visitors are mostly Slovakians (Kočišová 2007).

Tab. 3 The preferences of the interviewed visitors during the 2007 survey
(Source: http://www.vsmuzeum.sk/projekty/prieskum-zadiel)

Aim of visit	**%**	**General aim**	**%**
Trek through the Zádiel gorge	61%	Trekking	38,7
Trek to the Turňa fortress	14,5%	Visiting caves	18,5
Trek to the Háj waterfalls	8,8%		
Mode of transport	**%**	**Nationality**	**%**
By car	70	Slovakian	73
By bus	10	Hungarian	17,5
By train	8	Polish	7,9

Tourism development (Tab.4) is seen by the local community as important and a significant and 53% is willing to participate in this process. The improvements suggested by the locals would increase the availability and quality of tourism related services.

The available lodging capacity in Zádiel and Háj is given in Tab.5. There is only one basic catering facility at the upper end of the Zádiel gorge and a pub in Hačava

TOURIST DESTINATION LIFE CYCLE AND THE PERSPECTIVES OF SUSTAINABLE DEVELOPMENT

All tourist destinations manifest a life-cycle. The life cycle depends also on the type of tourist attraction, service capability, local population and tourists. (Coelho, Butler 2012). Johnston (2001) identifies that a destination has to have basic resources (environment and culture), services (accommodation, animation, health and built areas) as well as governance (public services, infrastructure, development plans). The life cycle of a destination has –

[1] All the selected days are holidays in Slovakia.
[2] The estimation is based on the assumption that there are at least 44 visitors per weekend throughout the year. This may underestimate the actual numbers.

according to Butler (1980) six stages of evolution: exploration, involvement, development, consolidation, stagnation and "post-stagnation" or possible decline. Coelho, Butler (2012) created scenarios for comparing different (simulated) destination environments. Tab.6. shows the data for Zádiel and Háj villages and their surrounding.

Tab. 4 Results of the survey made in 2006 regarding the view of the local community on tourism development (Kováčová 2007). Number of respondents: 30 (18% of the total population). Only answers important for our research are included.

Question	Responses in per cents	
What do you consider the main attraction of the area		
The natural environment	97	
What are the reasons of inadequate tourism development?		
Low commitments of the local government	33	
How important is:		
Attracting tourists	very important	40
Safety	very important	83
Are you disturbed by tourists?	Yes	37
	No	63
Would you be willing to be involved in tourism development?	Yes	53
	No	27
How would you secure adequate lodging and catering for tourists?	Building chalets	33
	Providing B&B	17
	Building a restaurant	40

Tab. 5 Lodging facilities in Zádiel and Háj (Želinská 2011)

Name of the facility	Type of facility	Capacity
Flachbartová Zádiel	Family hotel	22
Horáreň Zádiel	Chalet	7
Gazdovský dvor Zádiel	Family hotel	10
Kulcsárová Háj	Family hotel	7

Tab. 6 The variables needed for the calculation of the Tourist development index (TDI) for Zádiel and Háj. Data are given only for 2006.

Tourist conditions														Resid. popul.	Foreign. tourists[3] (estimate)
N	R	%	No.	No.	No.	No.	%	No.	No.	No.	No.	%	No.		
		PA	CH	AC	A	MA	HP	S	IA	HR	CI	UP	SV		
1	A	50	1	4	3	0	1	1	5	6	3	5	3	167	28000 p.a.
2	B	50	1	2	4	0	1	1	3	5	3	3	3	275	14000 p.a.
	Total	100	2	6	7	0	2	2	8	11	6	8	6	442	42000

Explanations:

N – number of competitors	HP – habitation park
R – identification of competitors (A – Zádiel, B – Háj)	S – security
PA - Protected areas	IA – internal accessibility
CH – classified heritage	HR – human resources
AC - accommodation	CI – Information and communication
A animation	S – services
MA – medical assistance	UP – urbanization plans

[3] By foreign we understand tourists coming from outside the village. Country-wise foreign tourists represent only about 25% of visitors.

The Tourist development index can be described by the following equation (Coelho, Butler 2012) :

TDI = f (P,T,D)

where P represents the resident population, T the foreign tourists and D the tourist conditions.

As the data represent only one time section, the TDI could not be calculated for these villages and new data will have to be periodically collected. Nevertheless, it is important to note that if the tourism is to develop in these areas, the above factors could be used for assessing the attractivity of the area as well as the stage of development they are in.

Butler (1980) defined the Tourist Area Life Cycle (TALC). It is pointed out that a tourist area life cycle starts with exploration and after consolidation and stagnation ends in either rejuvenation or decline (Fig.2). The key factor is the number of tourists visiting the place over time. After looking at Tab.6 and at the results of interviews with the Mayors of the respective villages it seems evident that both localities are in the involvement stage (in spite of the long time that elapsed after primary exploration stage). The inhabitants are starting to explore the possibility of getting involved in rural tourism or simply in providing lodging services for tourists coming to visit the area. The number of non-local inhabitants is also slowly increasing. In Zádiel, out of 167 inhabitants, 23 (14% approx.) are non-local residents that own a property for semi-permanent residence. In Háj, out of 275 inhabitants, 35 (13% approx.) have the same position.

In case of both villages – apart from being at the entrance of a beautiful tourist sites – they have still a lot of the original agricultural atmosphere, work tools and rural. There are also archaeologically and historically significant sites habits (cf. Tóthová 2003, Kočišová 2007, Timčák 2013). As shown in Fig.2, when the area achieves the *development* stage, the village points of interest (like the restoration of water powered mills for scutching linen stalks, restoration of the nearby Turňa nad Bodvou fortress, establishing houses of local culture, etc.) would be made more attractive and they would provide tourist services. Still, there is a risk that the village would become a tourist village and its basic attraction – a functioning agricultural village – could be lost. If rural tourism would also develop, commoditisation could occur and it could be culturally depleted as an attraction (Fig.3).

In order to prevent this to happen, it is important to perform the calibration of the area and determine the carrying capacity as well as the LAC - limits of acceptable change (cf. Timcak, Jablonska, Jurkasova 2010). At present, there is a number of unresolved issues like visual pollution (e.g. the family hotel at the mouth of the Zádiel gorge or Gipsy homes in Háj, illegal litter dumps) or the impact of car traffic pollution, noise pollution, tourist behaviour and impact, etc. (cf. Wall, Mathieson 2006, Timcak 2011).

The “technical” approach to studying tourism impact on a tourist destination works with a relatively limited factors (Butler 1980), but a more complex approach (e.g. Wall, Mathieson 2006) deals also with the impact on the whole social, cultural and natural fabric of the studied area. As mentioned, if the area is “overdeveloped”, and the number of visitors would cross the carrying capacity threshold, it could lead to a deterioration and eventually abandonment of the area, which then could regress to its pre-tourism functional modus. As shown by Shian Loong (2012), after a certain tourist density, the tourist flow comes to a stasis and the destination would not be visited.

The impact of geotourism on the two villages at present comes from tourism related traffic and tourists trekking through the gorges and adjacent areas like the karst plateau of Zádiel (cf Fig.4). Trekkers are the main source of thrash (plastic bottles, tins, plastic bags, etc.) in the Zádiel area (cf. Tab.1), whilst in the Háj gorge the Gipsy community in Hačava at the upper end of the gorge also contributes to pollution by waste materials found in the local stream and in the woods.

The calibration for the carrying capacity concerns a number of areas. The natural resources (Pedersen 2002, Coccosis et al. 2001, MRG 2007) are one of the most important ones. Here negative impacts to be measured are e.g.

- human overcrowding resulting in environmental stress;
- animals showing changes in behaviour;
- erosion of trails;
- increased pollution, noise, litter, or resource extraction,
- harm of natural and culturally important features of the area (Brandon, 1996).

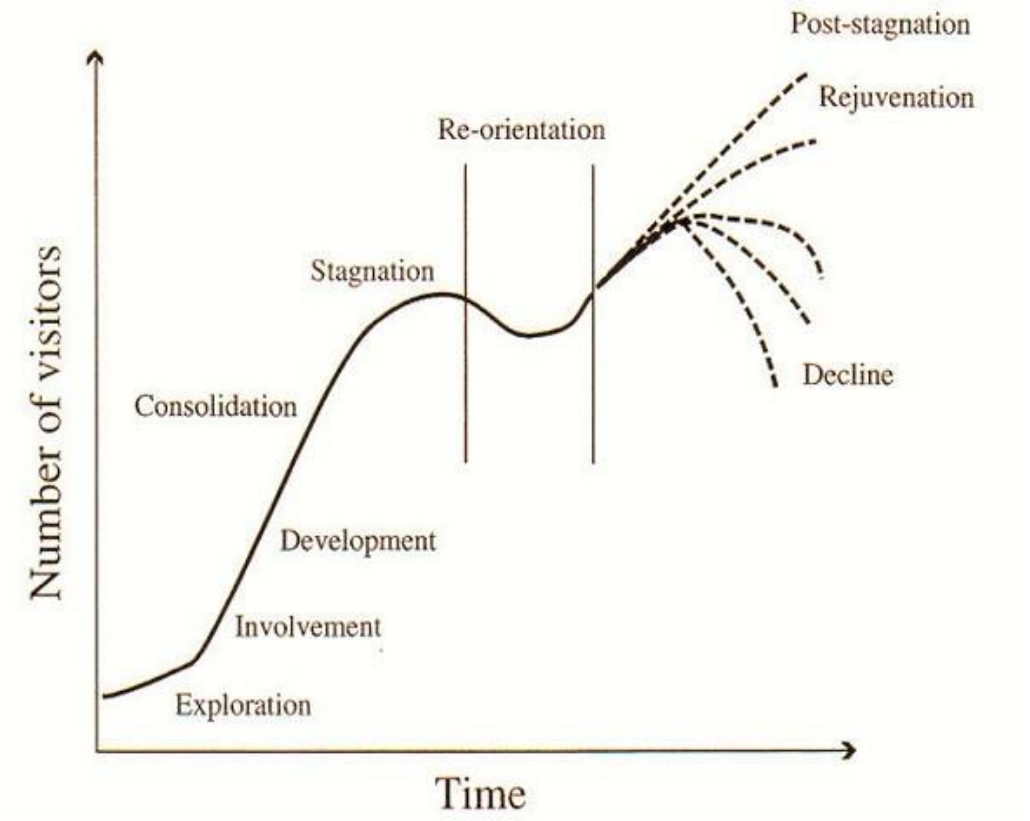

Fig. 2 A modified Butler Tourist Cycle of Evolution Model (Agarwal 2002)

Then the social and communal resources are to be calibrated as well as the attractivity and development potential, the physical and ecological components like

- Acceptable level of congestion in key areas (trails, streets, parks, restaurants etc.)
- Maximum acceptable loss of natural resources (e.g. fauna, vegetation, land, water) without deterioration of the ecosystem
- Acceptable level of air, water and noise pollution (limited by the tolerance of the eco system)
- Intensity of use of transport infrastructure, facilities and services (including trails)
- Use and congestion of utility facilities and services (water supply, electric power, waste management, etc.)
- Adequate availability of other communal facilities and services (public health, safety, housing, etc.).

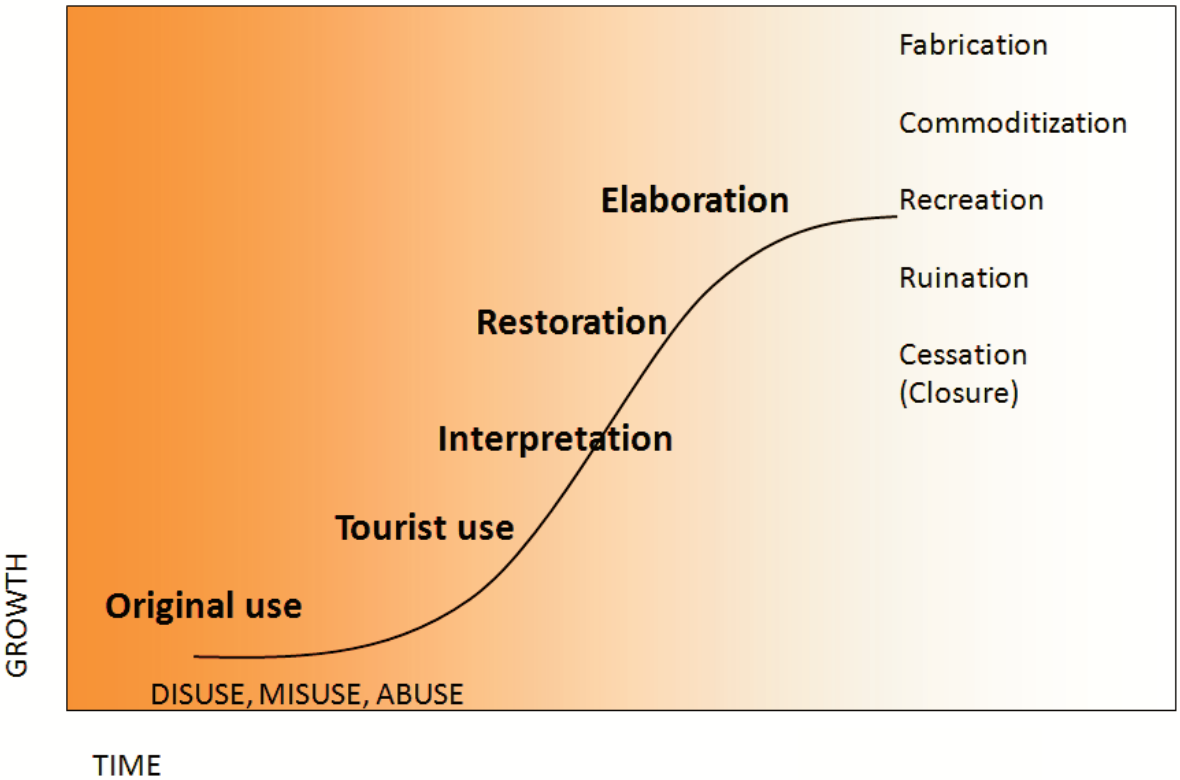

Fig. 3 A TALC life cycle in case of heritage sites (Butler 2011)

Fig. 4 The Fortress of Turňa nad Bodvou. To the right is the Háj village and the Háj gorge, to the left is the Zádiel village and Zádiel gorge (Photo: G.M. Timčák).

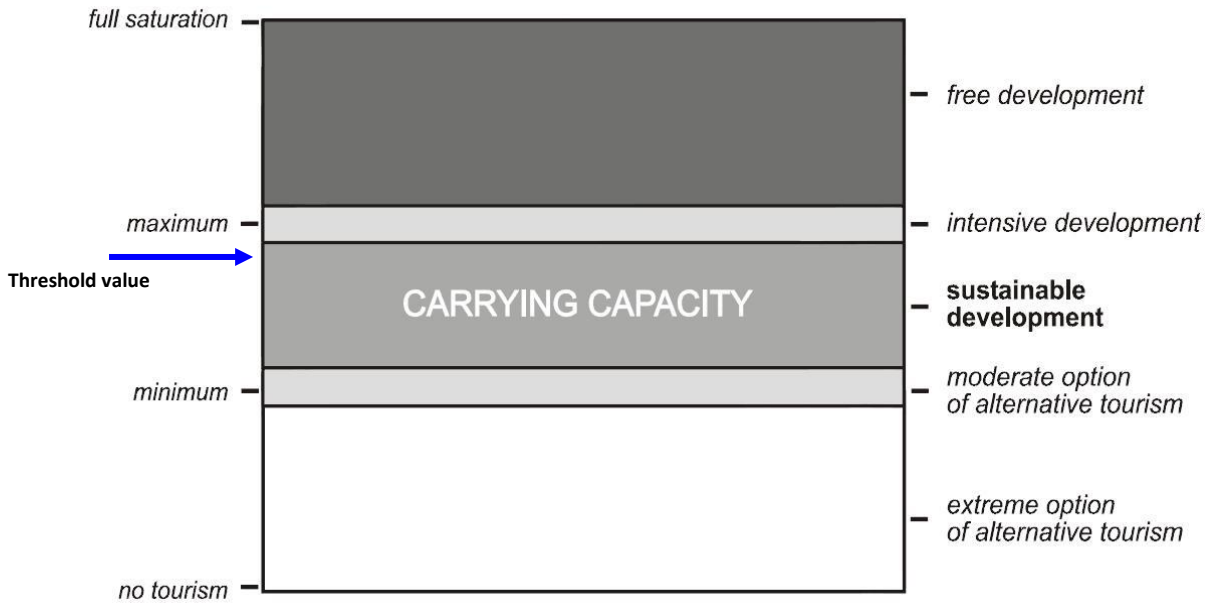

Fig. 5 Carrying capacity and the various modes of development of a region (Team 1999). The blue arrow shows the threshold value, above which the development would be undesirable.

The social and demographic component consists mainly of

- Number of tourists activities that can be absorbed without affecting the identity, lifestyle, social patterns etc. of local communities[4].
- Level and type of tourism which does not alter significantly local culture
- Level of tourism that will not be resented by local population
- Level of tourism ensuring that there will not be an unacceptable decline of experience of visitors.

The political and economic component concerns

- Level of specialization in tourism
- Loss of workforce in other sectors due to tourism
- Revenue from tourism and its distribution at local level
- Level of employment in tourism in relation to local human resources (cf. Timčák et al. 2011).

As not all the needed data are available at present, for a more complete assessment, further field data collection is necessary.

CONCLUSIONS

From the above points it follows that the studied area has a favourable environment for geotourism development. The assessment of carrying capacity, LAC, of the Butler Tourist Cycle of Evolution Model and TALC life cycle model needs further research, even though preliminary results were presented. On the basis of available data shown in the Tables, it can be postulated, that the studied localities did not reach the stage of *consolidation* (cf. Fig.2) or *interpretation* stage (Fig.3), and the intensity of tourism is below the threshold of carrying capacity (Fig.5).

[4] This is difficult, as tourism development always influences the local communities. Also cultural habits necessarily change with time due to tourism (cf. Timcak 2011).

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MONITORING OF (GEO)TOURISM IMPACTS REVIEW

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ABSTRACT
Tourism is, thanks to its multiplicity and the way of providing services, sector which is very demanding from the point of capturing reality. It also brings a number of benefits to social and economic development of the region, but also a certain risk, which should be continuously monitored. The paper presents a summary of selected methods for monitoring the tourism impacts, where they are divided into so-called standard, economic analyses and also an example to measure the environmental impacts of tourism. Another part of the paper provides the description of sources of impacts that largely affect impacts themselves. The role of the paper is to summarize the chosen methods and highlight the essence of monitoring, because prevention of negative impacts of tourism can be achieved by the exact monitoring, which increases the efficiency and quality of geo-conservation, thus ensures the preservation of cultural and natural heritage for future generations.

Keywords: monitoring, tourism, impacts, review

INTRODUCTION

Tourism is an industry that can greatly affect the development of the region or country. In recent years, research in the field of tourism is focused mainly on its sustainable development. Sustainable tourism development depends on the ability of its subjects to maximize benefits and minimize costs. The exact definition of tourism impacts and their monitoring assists in planning and establishment of a sustainable tourism industry.

In the interest of rational tourism organization, analysis and generalization should be based on regional cultural aspects. Socio-cultural, economic, natural and ecological impacts, city planning as well as organizations and management issues should be the most important aspect of the analysis for the future development of tourism in regions and countries, in the most positive way.

TOURISM IMPACTS

The impacts of tourism can be sorted into seven general categories:

1. Economic
2. Environmental
3. Social and cultural
4. Crowding and congestion
5. Services
6. Taxes
7. Community attitude

Each category includes positive and negative impacts. Not all impacts are applicable to every community because conditions or resources differ. Community and tourism leaders must balance an array of impacts that may either improve or negatively affect communities and their residents. Leaders must be sensitive and visionary, and must avoid the temptation of glossing over certain difficulties tourism development creates. Tourism leaders must also balance the opportunities and concerns of all community sectors by working against conditions where positive impacts benefit one part of the community (geographic or social) and negative impacts hurt another (Kreag, 2001).

MONITORING OF TOURISM IMPACTS

When monitoring - measuring the impacts of tourism, it is theoretically possible to identify two phases:

1. Phase of processing the methodology and standards of collection, sorting and processing 2. The actual phase of working with data

Standard methods of monitoring

In general, it is possible to use standard methods of monitoring to record the real processes which can be divided into:

- The methods applied on the spot:
  1. questionnaire survey, in which we ask the questions: a) direct participants of tourism in order to find out detailed information about their behavior, b) service providers, about the number and characteristics of accommodation, carriers, catering facilities and other providers of additional services
  2. observation, e.i. number of passing vehicles records, behavior of tourists, number of tourists, waste production, ..
- "communication methods", which, thanks to the development of IT technologies, belong to innovative methods of monitoring the tourism impacts
  1. telephone survey, which is used for monitoring abroad and it is based on connection with the local community on the phone to identify and map the tourism impacts in the community (mainly social and cultural impacts of tourism on the local population are monitored)
  2. questionnaire survey, which is not done on the spot, but on the Internet, in this case, the questions must be asked with regard to possible differences.
- Statistical methods can be divided into two groups:
  1. Monitoring of demand (e.g. average visitor spending ...),
  2. Monitoring of supply (e.g. number of beds / rooms in accommodation facilities ...) (Ščuroková, Sehnálková, 2013)

Economic impacts of tourism monitoring

Tourism's economic impacts are an important consideration in state, regional and community planning and economic development. Economic impacts are also important factors in marketing and management decisions. Communities therefore need to understand the relative importance of tourism to their region, including tourism's contribution to economic activity in the area.

A variety of methods, ranging from pure guesswork to complex mathematical models, are used to estimate tourism's economic impacts. Studies vary extensively in quality and accuracy, as well as which aspects of tourism are included. Technical reports often are filled with economic terms and methods that non-economists do not understand. On the other hand, media coverage of these studies tend to oversimplify and frequently misinterpret the results, leaving decision makers and the general public with a sometimes distorted and incomplete understanding of tourism's economic effects.

Tourism has a variety of economic impacts. Tourists contribute to sales, profits, jobs, tax revenues, and income in an area. The most direct effects occur within the primary tourism sectors --lodging, restaurants, transportation, amusements, and retail trade. Through secondary effects, tourism affects most sectors of the economy. An economic impact analysis of tourism activity normally focuses on changes in sales, income, and employment in a region resulting from tourism activity.

A standard economic impact analysis traces flows of money from tourism spending, first to businesses and government agencies where tourists spend their money and then to:

- other businesses -- supplying goods and services to tourist businesses,
- households – earning income by working in tourism or supporting industries, and
- government -- through various taxes and charges on tourists, businesses and households

Formally, regional economists distinguish *direct, indirect, and induced economic effects*. Indirect and induced effects are sometimes collectively called secondary effects. The total economic impact of tourism is the sum of direct, indirect, and induced effects within a region. Any of these impacts may be measured as gross output or sales, income, employment, or value added.

Direct effects are production changes associated with the immediate effects of changes in tourism expenditures. For example, an increase in the number of tourists staying overnight in hotels would directly yield increased sales in the hotel sector. The additional hotel sales and associated changes in hotel payments for wages and salaries, taxes, and supplies and services are direct effects of the tourist spending.

Indirect effects are the production changes resulting from various rounds of re-spending of the hotel industry's receipts in other backward-linked industries (i.e., industries supplying products and services to hotels). Changes in sales, jobs, and income in the linen supply industry, for example, represent indirect effects of changes in hotel sales. Businesses supplying products and services to the linen supply industry represent another round of indirect effects, eventually linking hotels to varying degrees to many other economic sectors in the region.

Induced effects are the changes in economic activity resulting from household spending of income earned directly or indirectly as a result of tourism spending. For example, hotel and linen supply employees, supported directly or indirectly by tourism, spend their income in the local region for housing, food, transportation, and the usual array of household product and service needs. The sales, income, and jobs that result from household spending of added wage, salary, or proprietor's income are induced effects.

By means of indirect and induced effects, changes in tourist spending can impact virtually every sector of the economy in one way or another.

Multiplier in tourism

Multipliers capture the secondary economic effects (indirect and induced) of tourism activity. Multipliers have been frequently misused and misinterpreted in tourism studies (Archer, 1984) and are a considerable source of confusion among non-economists. Multipliers represent the economic interdependencies between sectors within a particular region's economy. They vary considerably from region to region and sector to sector. There are many different kinds of multipliers reflecting which secondary effects are included and which measure of economic activity is used (sales, income, or employment).

For example:

TYPE 1 *sales multiplier = direct sales + indirect sales/direct sales*

TYPE 2 *sales multiplier = direct sales + indirect sales + induced sales/direct sales*

TYPE 3 *Income multiplier = Total direct, indirect, and induced income/direct sales*

TYPE 4 *Employment multiplier = Total direct, indirect, and induced employment/direct sales*

The economic impacts of tourism are typically estimated by some variation of the following simple formula:

*Economic Impact of Tourism = Number of Tourists * Average Spending per Visitor * Multiplier*

Types of economic analyses for tourism impacts

There is a number of economic analyses that can be applied also to measure the impacts of tourism. Some of the analyses are mentioned and divided into groups according to the object of study.

Fiscal impact analysis - identifies changes in demands for government utilities and services resulting from some action and estimates the revenues and costs to local government to provide these services (Burchell and Listokin, 1978).

Economic impact analysis – An economic impact analysis traces the flows of spending associated with tourism activity in a region to identify changes in sales, tax revenues, income, and jobs due to tourism activity. The principal methods here are visitor spending surveys, analysis of secondary data from government economic statistics, economic base models, input-output models and multipliers. (Frechtling, 1994)

Financial analysis - A financial analysis determines whether a business will generate sufficient revenues to cover its costs and make a reasonable profit. It generally includes a short-term analysis of the availability and costs of start-up capital as well as a longer-range analysis of debt service, operating costs and revenues. A financial analysis for a private business is analogous to a fiscal impact analysis for a local government unit.

Demand analysis - A demand analysis estimates or predicts the number and/or types of visitors to an area via a use estimation, forecasting or demand model. The number of visitors or sales is generally predicted based on judgement (Delphi method), historic trends (time series methods), or using a model that captures how visits or spending varies with key demand determinants (structural models) such as population size, distance to markets, income levels, and measures of quality & competition (Walsh 1986, Johnson and Thomas 1992).

Environmental Impact assessment – An environmental assessment determines the impacts of a proposed action on the environment, generally including changes in social, cultural, economic, biological, physical, and ecological systems. Economic impact assessment methods are often used along with corresponding measures and models for assessing social, cultural and environmental impacts. Methods range from simple checklists to elaborate simulation models (Williams, 1994).

Environmental impacts monitoring

Areas with high-value natural resources, like oceans, lakes, mountains, unique flora and fauna, and great scenic beauty attract tourists and new residents who seek emotional and spiritual connections with nature. Because these people value nature, selected natural environments are preserved, protected, and kept from further ecological decline.

Lands that could be developed can generate income by accommodating the recreational activities of visitors. Tourist income often makes it possible to preserve and restore historic buildings and monuments. Improvements in the area’s appearance through cleanup or repairs and the addition of public art such as murals, water fountains, and monuments (part of making a community ready for tourism) benefit visitors and residents alike. Tourism is generally considered a "clean" industry, one that is based on hotels, restaurants, shops and attractions, instead of factories.

Tourism can also degrade an environment. Visitors generate waste and pollution (air, water, solid waste, noise, and visual). Natural resource attractions can be jeopardized through improper uses or overuse. Where water is scarce, tourists can overwhelm the available supply. Travellers can also inadvertently introduce no indigenous species, as can increases in the trade of animals and plants. A constant stream of visitors and domestic pets may disrupt wildlife by disturbing their breeding cycles and altering natural behaviours.

It is therefore necessary to consider the environmental effects of tourism. Appropriate way to assess this issue is to use the DPSIR causal chain.

Driving force (driver)- Describes social, demographic, and economic developments. Primary driving forces are population growth and changes in people's needs and activities. These change lifestyles and overall levels of production and consumption, which in turn exert pressures on the environment.

Pressure - Tracks people's use of natural resources and land, and production of waste and emissions (for example, greenhouse gases and particulates into the air). These pressures can change environmental conditions.

State - Describes the quantity and quality of the environment and natural resources (for example, water quality, air quality, or land cover).

Impact - Describes the effects that environmental changes have on environmental or human health (for example, the level of human illness related to exposure to air pollution).
Response - Describes responses by government, organisations, or the community to prevent, compensate, ameliorate, or adapt to changes in the environment (for example, the introduction of regulations such as national environmental standards and legislative initiatives to protect native vegetation and biodiversity).

The DPSIR model (Fig. 1) shows how human activity (also known as a driver or driving force) exerts pressure on the environment and, as a result, changes the state of the environment. The state of the environment can have impacts on people's health, ecosystems, and natural resources. These impacts can result in responses in the form of management approaches, policies, or actions that alter the driving forces, pressures, and, ultimately, the state of the environment. Changes in impacts over time can result in people modifying their response to those impacts (European Environment Agency, 2003).

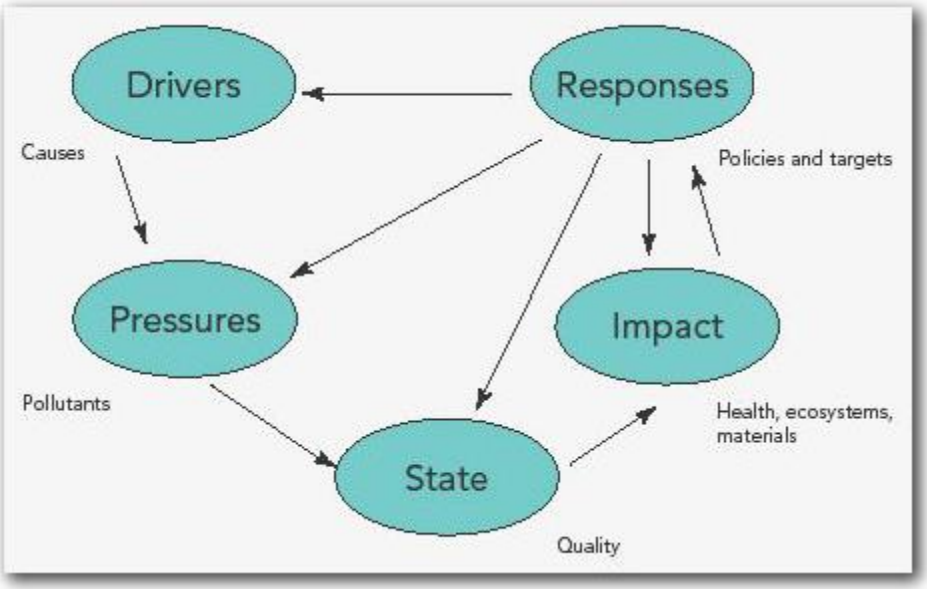

Fig. 1 DPSIR model (Source: European Environment Agency, 2003)

SOURCES OF TOURISM IMPACTS

Knowing the nature of tourism impacts will not automatically lead to solutions. It is equally important to identify the sources of these impacts and how they influence interactions between tourists and residents, the host community, and the environment. Researchers generally divide these impact sources into two groups: *tourist factors and destination factors*. Tourist factors are those which tourists bring to the destination and include such elements as demographic characteristics, social differences, and numbers of visitors. Destination factors are those that are part of the destination itself, such as travel linkage and circulation, local acceptance of tourism, and local vitality and leadership.

Tourist factors: Number and type of visitors, Length of stay, Mass arrivals and departures, Links to community residents, Ethnic/racial characteristics, Economic characteristics, Activities selected, Ability to speak local language/accents, "Demonstration effect" of tourists
Destination factors: Local economic condition, Diversification of the economy, Degree of involvement in tourism, Attitudes of tourism leaders, Spatial characteristics of tourism development, Viability of the host culture, History of stability in the community, Pace of tourism development, Fragility of the environment used by tourists, Public transportation options (Kreag, 2001).

CONCLUSION

Evaluation of the contribution of tourism to the economic development in host regions requires an analysis of linkages between tourism and other sectors, understanding the spatial location of tourist activities and identification of recipients of economic and other impacts. This means that if tourism is to have a significant impact on the economy of a country or a region, it should have a close link with the rest of the domestic economy. Tourism can therefore be a catalyst for national and regional development, bring employment and significant infrastructure development, benefiting local residents and visitors. This development is, however, necessary to regulate, respectively monitor its impacts, for the possibility of an early interception.

Some impacts of tourism can be managed and controlled. If properly managed, tourism has the potential to become an industry of renewable resources where the integrity of sources is maintained or even enhanced. If managed improperly, or extended in the short-term goals and objectives, they have the ability to destroy resources on which they are built.

Therefore the essence of monitoring is the prevention of negative impacts of (geo)tourism. It also increases the efficiency and quality of potential geo-conservation and ensures the preservation of cultural and natural heritage for future generations.

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TOURISM AREA LIFE CYCLE MODEL IN THE DEVELOPMENT OF GEOTOURIST ATTRACTIONS

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ABSTRACT
Geotourist projects and attractions concerning development of geological and mining heritage objects for tourism should be treated as the typical investment projects. Such undertakings are also tourist projects, which are based on creation of tourist product as well as its promotion and development aim to attract visitors. The paper deals with possibilities of using the Tourism Area Life Cycle drawn up by R.W. Butler in the development of geotourist attractions in the long-term perspective. The Butler's model of tourist area evolution may be also used for interpreting the mine's phases of development.

Keywords: Tourism Area Life Cycle TALC, Butler's Model geotourist project, postindustrial tourism

INTRODUCTION

Contemporary tourism development requires different conditions and the most important of them are tourist attractions, which play a key role in the tourism system. The tourist attractions include different issues, from elements of culture and nature through the tourist facilities and technical infrastructure to the diverse experiences. Also geotourist attractions are different in case of different type of geotourist project and its specificity.

As a result of dissemination the knowledge about historical and cognitive values of geological and mining heritage objects and larger access to European Union' funds a lot of new geotourist projects in Poland have been realized during recent years. The peculiar kind of these undertakings is making use of the remains of former mining activity as major attractions within postindustrial tourism trend. These projects might be among other things: mining and industry museums, former mines and smelters adapted for visitors movement, surface routes, underground tracks with multimedia shows, recreation parks, heritage parks as well as post-mining sites with some kind of tourist infrastructure. Proper preservation and preparation of geological and post-mining remnants in aspect of making them available for tourists is only the first phase in process of building the value of the new tourist attraction.

TOURIST VIRTUE IN GEOTOURIST PROJECT

The basic importance for visitor has got a tourist virtue. In case of geotourist project this is a unique or specific feature of natural environment or form of human activity which is the subject of tourist interest. The value of the virtue depends on its location, uniqueness, originality, usefulness and perception of its features by the visitor. Planning of geotourist project should focus on emphasizing and distinguishing of these tourist virtues, which are the most important in educational and heritage point of view. In case of postindustrial tourism the main value is displaying of postindustrial landscapes in the meaning of being assets as well as manifestation of human achievements in technology and culture (Fig. 1).

Nevertheless all initiatives and projects connected with development of geological and mining heritage objects or sites for tourism are quintessential investments in context of their plans preparation and execution. They require the initiator, executive team and coordinator, well-prepared budget, specific permissions and local authority engagement. But on the other hand, as practice shows, they involve commitment and cooperation among different specialists.

Fig. 1 The Tradition Park in Siemianowice Śląskie within Industrial Monuments Route in the Silesian Prowince, Poland (photo: www.parktradycji.siemck.pl)

Protection and exposure of post-mining relicts very often requires cooperation of experts from various branches like geology, mining, architecture, environmental protection, archaeology, reclamation, building law, mining law and sometimes many others. Part of tasks or requirements for them can be known at the beginning of the project but part of them sometimes is unpredictable. That's way the first assignment for investor or beneficiary should be very good schedule of the project with cost-effectiveness calculation as well as its continuous updating.

In the framework of geotourist project realization within investment project structure the main questions are: what will be the reception of the project results by visitors and how carry this project out to obtain a new tourists destination. For all these plans preparation and execution the concept of Tourist Area Life Cycle may be very useful.

THE CONCEPTION OF TOURISM AREA LIFE CYCLE

Like most products and destinations the geotourist product has a lifecycle. In his 1980 article, Richard W. Butler proposed a widely-accepted model of the lifecycle of tourist area. The concept of the Tourism Area Life Cycle (TALC) Model ties to the familiar economics theory of the product life cycle and the development of animals populations [1]. TALC is the model which describes the changes occurring the evolution of a tourist area as well as tourist product.

Butler in cooperation with other researchers elaborated the mathematical model describing the development of tourist destination. Every kind of that development could be transformed to the logical equation:

$$\frac{Dv}{Dt} = kV(M - V) \qquad (1)$$

where:
V - number of visitors
T - time
M - maximum number of visitors
k - empirically estimated parameter representing the spread of knowledge about the tourist area

According to Butler's Model the changes occurring the evolution of a tourist area are described by six phases which are characterized through various dynamics and development direction. The variable is the number of visitors coming to the tourist area in one year period. These various phases are:

- *Exploration,*
- *Involvement,*
- *Development,*
- *Consolidation,*
- *Stagnation,*
- *Rejuvenation* or *Decline* (Fig. 2).

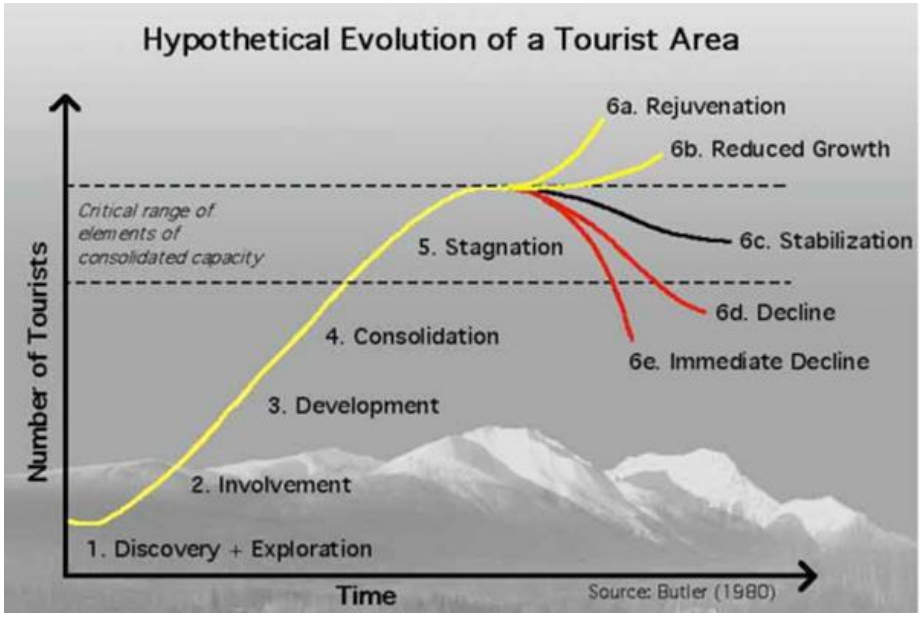

Fig. 2 Richard W. Butler's Tourism Area Life Cycle (on the basis of [1])

The basic idea of TALC Model is that tourist destination begins as a relatively unknown and visitors initially come in small numbers restricted by, for instance, the lack of access, knowledge or facilities. This phase is labeled as *Exploration* and the main virtue here is a cultural or natural value.

When more people discover the destination and the amenities are increased and improved. This is *Involvement* phase, in which inhabitants of the region start raise revenue from accommodation, gastronomy or other services. This is the period when the conveniences for tourists are welcome the most.

The *Development* phase begins when the tourist are becomes one of the main sources of revenue in the region and the number of tourists is similar of exceeds the number of permanent residents.

The next phase is *Consolidation*, which in Butler's Model marks the full of development of tourism functions in the project area. It means the slowdown of number of tourists' growth and giving tourism the dominant signification in the region.

Tourist arrivals grow toward some theoretical carrying capacity (*Stagnation*), which involves social and environmental limits. In Tourism Area Life Cycle this phase doesn't mean the standstill and depression but it means the development stage. This is the peak of number of visitors coming to project area and after that it starts to decline. The last phase in Butler's Model is either the *Rejuvenation* or *Decline* of the area's tourist function.

In case of the *Decline* there is a drop in number of visitors and the unprofitable tourist sites are closured. It means the tourist area can't be competitive and the location becomes unattractive. The area can however enter the *Rejuvenation* phase but it is impossible without complex recovery program implementation.

The possible trajectories indicated by dotted lines 6a-6e are examples of a subset of possible outcomes beyond *Stagnation* phase (Fig. 2). Examples of reasons that can cause a destination to follow trajectories 6a and 6b toward *Rejuvenation* are technological developments or conveniences improvements leading to increased carrying capacity. Examples of reasons that can cause a destination to follow trajectories 6c and 6d are unsustainable development or the finish of resources which attracted tourists. It can be also the congestion of the area. Trajectory 6e presents the likely way of a destination following a crisis.

It the theory there are many indicators that characterize the various phases of the cycle of tourist area development but we can define the phase only from the perspective of the whole cycle.

THE LIFECYCLE OF GEOTOURIST PROJECT

The course of the logistic function which describes the Butler's Tourist Area Life Cycle may vary seasonally and differs regarding to the conditions and features of the tourist destination as well as numbers of visitors in different periods of time. The Butler's Model was tested by many researchers who found similarity with different types of tourist projects. Z. Kruczek and A.R. Szromek estimated a mathematical formula of the development of tourist traffic at the Salt Mine in Wieliczka from 1945 to 2009 [4]. While the logistic function is a great model to explain the development of many projects and phenomena, its interpretation is not a simple matter. On the other hand there is no possibility to predict different incidents using the model, especially in case of its last phase.

During the analysis of the development of the tourism traffic at the Salt Mine in Wieliczka over a period of 65 years several changes in the area's direction of development were identified [4]. Their interpretation showed that all phases are in line with the phases in the Tourist Area Life Cycle within two cycles. For example the period of 1978-81/1991 corresponds with the *Decline* phase. Then the reduction of tourist' visits was observed due to the introduction of Martial Law and weakness of socio-economic situation (Fig. 3).

If we examine the curves in the development of the intensity of tourist traffic in different kind of geotourist projects the variety of their courses will be noticed well. For instance the rise from *Exploration* to *Stagnation* may happen with different rapidity.

In the newly opened Underground Track 'St. Johannes' Mine and Tourist Route "*By the traces of the former ore mining*" in the Mirsk Commune (Fig. 4) the *Exploration* phase has begun in the 1st quarter of 2013, when local authorities started to prepare to the opening ceremony.

In the *Exploration* phase of geotourist project the main role of its owner or operator is to build the brand of the destination. On the basis of new tourist infrastructure and its potential the system of short-term and long-term activities for taking advantage of that should be laid

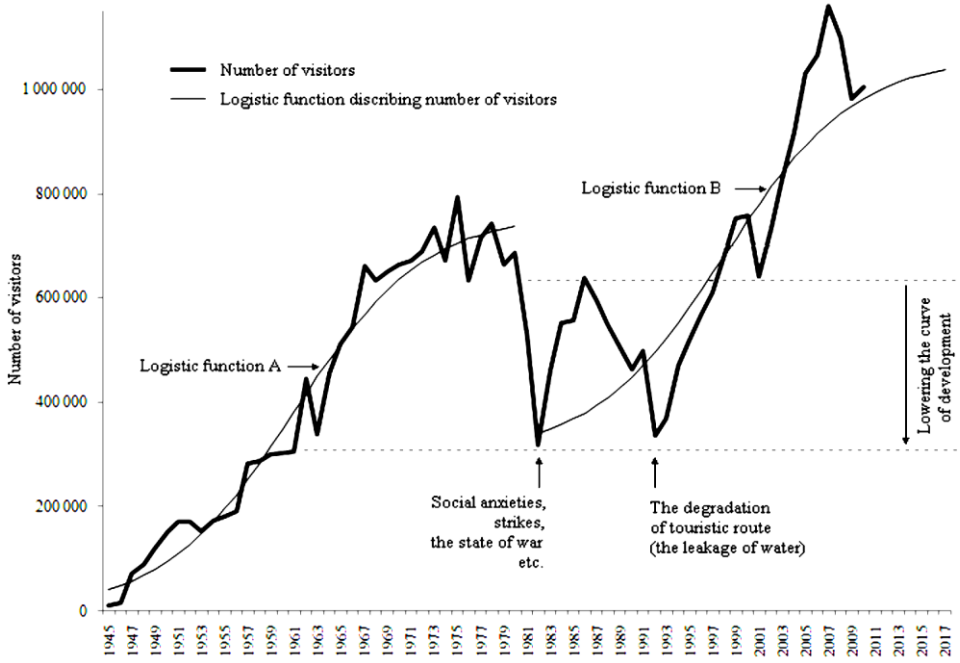

Fig. 3 Two cycles of development of the Salt Mine in Wieliczka (Source: [4])

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Fig. 4 The interior of exhibition pavilion in 'St. Johannes Mine" in Krobica within the Tourist Route '*By the traces of the former ore mining'* in the Mirsk Commune (photo M. Szpak)

down. In the author's opinion the most important activities are recognition and establishing the tourist profile as well as the wide promotion campaign [3].

Owing to the knowledge about the visitor it is possible to create the products and services which are suitable to his expectations and needs. One of the way of visitor profile cognition is marketing research. The first phase in TALC Model is strongly connected with the project planning. It is possible to predict the numbers of visitors in relatedness with the tourist virtues' assessment and tourist attractions' planning. In case of the Underground Track 'St. Johannes' Mine and Tourist Route "*By the traces of the former ore mining*" the number of visitors after the opening ceremony turned out bigger than had been assessed.

In the *Involvement* phase also the reconnaissance of the perception and evaluation of a new tourist area by visitors may be very useful for preparing the development plan which will help to boost the number of visitors in the future (*Development* phase in the cycle). The duration of the *Development* phase varies in case of every undertaking. However, it might be extend owing to fulfillment the new tourists' needs.

There is no clues for predicting when and why the *Consolidation* and *Stagnation* phases will start but sometimes we can foresee its symptoms. The *Stagnation* means the particular capacity with the social and environmental limits in definite time and under the definite conditions but sometimes its extension is manageable. The Butler's TALC Model can be applied for planning of accommodation base development and development of the tourist attractions aim to counteracting the drop in number of visitors. The most of these changes manifestations creating the progress and the project development is connected with next impacts on the natural environment. These impacts almost always start within the geotourist project execution (reclamation process, infrastructure building, reconstruction of the adit etc.). It is very difficult, sometimes even impossible, to formulate policies that guarantee that tourism can be maintained for a long time without severely impacting on the environment [2]. This approach is based on the assumptions about the interaction between the tourists, the natural environment and the capital, and is very complex.

The beginning of the *Decline* phase (C and D trajectories in TALC Model) should be immediately noticed and the activities program for destination recovery must be prepared and practiced. The examples of such activities could be searching the new virtues of the geological or post-mining heritage site or development of additional recreational attractions. As a result of such intervention the trajectories C and D can change their destination course to follow trajectories A and B toward *Rejuvenation* phase. The tourism activities at this moment can also settle down to a plateau or still decline towards the closure of unprofitable tourist sites or objects.

The *Decline* phase might accompany either internal or external factors. It is obvious that the fortuitous events also happen (for example the leakage of water in the project area or the Martial Law in the Salt Mine 'Wieliczka') but a lot of declines in geotourist project' lifecycles regard to the downturns of attractiveness for visitors. The observations of tourist movement on geotourist tracks show that changes of tourist traffic related to changes of the form of geotourist attractions. It happens sometimes that it might be even one feature of one attraction which was significant in tourist's perception in short time period.

SUMMARY

In the context of tourism studies the tourist traffic model is the function of features regarded to the capital, environment and tourists, but the basic benchmark of each tourist project success is the number of visitors. The knowledge about the Tourist Area Life Cycle drawn up by Richard W. Butler can be very helpful in planning and management of the projects connected with preparation of geological and post-mining remnants in aspect of making them available for tourists. The phases of this lifecycle show the volatility of the

number of visitors within the changes occurring the evolution of the tourist area. The cyclicity of the project development should prompt the management team of the geotourist project to devise the development strategies and to establish the contingency plans. The perfectly realized geotourist project should encompass different elements:

- assessment of tourist potential in geological and mining heritage sites,
- proper selection of objects/sites for future development,
- detailed objects evaluation according to their historical and cultural as well as recreational values,
- establishing actual conditions and development possibilities of these objects/sites in economics, legal and environmental aspects,
- monitoring the number of tourists, if possible,
- creation the project development plan and the vision of increase its value.

Only with pro-tourist attitude and above tasks' fulfillment the geotourist project could function in long-term perspective.

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A NEW GEOTOURISTIC ATTRACTION: TELEKES VALLEY

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ABSTRACT
This paper presents a less known tourist attraction in the famous Aggteleki Karst region: the valley of Telekes creek. The gorge like valley of Telekes creek is located in the Rudabánya Mts., NE Hungary, which is one of the most spectacular sights in the region. The surroundings of the valley also have numerous interesting attractions for the people, who come to this area as a tourist, where small settlements and other geotouristic destinations can be found.

Keywords: Telekes valley, geotourism, Perkupa

INTRODUCTION

There are many definitions to determine the geotourism, the first one was published by Thomas A. Hose [1]. The most pertinent definition is the following: "Geotourism is a knowledge -based tourism, an interdisciplinary integration of the tourism industry with conservation and interpretation of abiotic nature attributes, besides considering related cultural issues, within the geosites for the general public" [2]. There is also some overlap with other tourism segments such as 'eco-tourism', 'sustainable tourism', and 'alternative tourism', and 'cultural-and heritage tourism' [3]. For a small geographic area, like the Telekes valley, the geotourism is a very good possibility to connect the touristic economy and the market.
The aim of this paper to collect those potential geoturistic attractions along the gorge part of Telekes valley and related sights in the surroundings, which are suitable for bundling. Because of the diversity of the valley, it can be a potential destination for (geo)turists and scientists as well, however the area is less known. On the basis of this study further investigations are planned to be carried out by the authors. The establishment of a geoscientific exhibition, the possiblity of collecting rare minerals, the development of a touristic database containing information about the accomodations and other related infrastructure could improve the economical state of the region.

THE PHYSICAL- AND HUMAN GEOGRAPHICAL BACKGROUND OF GEOTURISM IN THE STUDY AREA

The Telekes creek is a left side tributary of Bódva river, its lenght is about 30 kilometers. The creek cuts through the Rudabánya Mts. in a spectacular, romantic gorge. The most beautiful section of the valley with the NE half of the mountains, which is the most valueable from geological, geomorphologic and ecologic point of view is part of the Aggtelek National Park.

The low Rudabánya Mts. (highest peak: Szőlő hill, 375 m) is located in Borsod-Abaúj-Zemplén county, NE Hungary (Fig. 1.), it is an independent microregion of the Aggtelek-Rudabánya Mts. mezoregion in the North-Hungarian Mts. region [4]. The surface of the area is chatacterized mainly by flat ridges [6].

The Rudabánya Mts. is geologically one of the most complex regions in Hungary [5]. It is mainly built up by Mesozoic sediments, which suffered multiple folding and were formed into nappe system. In the Tertiary (at the Oligocene-Miocene border), these rocks got into their recent position from the SW direction by lateral movements along SSW-NNE strike-slip faults of Darnó Zone [4],[6].

Following these lateral movements, for the effort of vertical tectonical movements, the ridges were risen above their surroundings. As a consequence of this uplift, the younger, Tertiary sediments were eroded and the Mesozoic karstic rocks resurrected on the NE part of

the mountains [6]. The karstic gorge of Telekes creek was formed in this area, where the diversity of Mountains' different rock types can be investigated.

The some of kilometers long section of the Telekes valley is the only karstic gorge in the Hungarian side of Aggtelek-Rudabánya Mts. [7], where 12 caves are known. Most of these caves are only some meters long, but 3 of them are longer than 10 meters. The largest one is the Ördög-gát-lyuk with its 82 m total length [8].

The climate of the microregion is mostly moderately cool – moderately wet, at some places moderately dry. Above 300 m the climate is cool – moderately wet [4], [9].

The sum of annual sunshine duration is less than 1800 hours. The annual mean temperature is 8,8 °C, lower than the country average. The annual amount of precipitation is 620 mm. The number of days with snow cover is about 50. The most typical wind direction is W, the average windspeed is 2,5 m/s [4],[9]. The only permanent stream of the microrgeion is the Telekes creek, which is the tributary of Bódva river. Following the snowmelt and after larger rainfalls, the discharge of the creek is significant, however the valley bottom is flooded only in extreme cases [4].

In long dry periods, generally at the second half of the summer the discharge is very low, periodically some sections of the valley could get dry.

The climazonal vegetation consists of mainly oaks (Quercus cerris) and hornbeam (Carpinus betulus), however, the area of these species is smaller than the area of edafic plants, which are specified by soil properties. The zonal vegetation is typical on the ridges and summits, while the edafic type lives on steep slopes and in the narrow gorges. In the gorges of Telekes creek several plant species can be found, which are generally typical on higher areas (for example: Aconitum vulparia, Astrantia major, Dentaria glandulosa, Scillia kladnii, Sesleria heufleriana, Waldsteinia geoides).

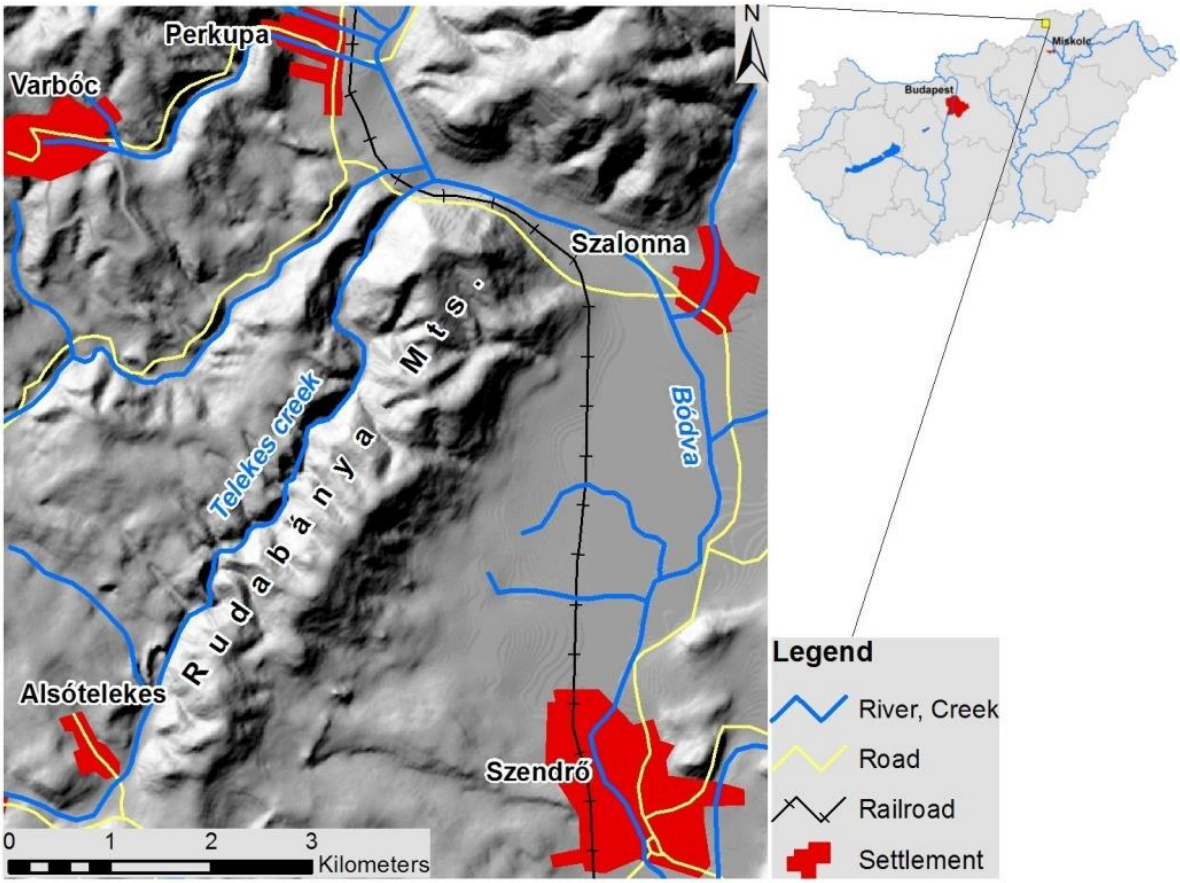

Fig. 1 Location and topographic map of Telekes valley

On the wide sections of the valley riverine willow-poplar and riverine ash-alder woodlands can be found [4]. There are karst scrub forests and slope steppes on sunny slopes of limestone ridges and hilltops, while open rocky grasslands grow on rocky slopes. In most plant community (phytocoenosis) spreading of adventive (most of them invasive) plant species (Acer negundo, Ailanthus altissima, Amorpha fruticosa, Asclepias syriaca, Reynoutria ssp., Robinia pseudoacacia, Solidago ssp. etc.) is general [4].

The predominant soil type is rendzina, which is formed on limestone parent material and characterized by shallow topsoil and low fertility. On the Tertiary sandy-clayey sediments acid brown forest soils were formed [4].

In addition to the natural properties, the knowledge of human conditions are also important for geotourism. One of the most important settlement close to the Telekes valley is Perkupa, which was first mentioned in 1340. The number of inhabitants is 918 [10]. Perkupa is famous for its „mason school", where the local masters combined the elements of religious and secular architecture, and applied this knowledge on the houses of the local peasants [11]. The masons learned their knowledge from the elder masters of the settlement. The former main street of the village is a possible tourist atrraction, where the works of these masons still can be found (Fig. 2.) [12]. Adapting to the geological conditions of the region, the buildings were made of stone. Based on narratives it is known, that between the two world wars 70-75, after the Second World War 90 masons lived in Perkupa, when the population was similar to today: in 1949, 968 inhabitants lived in the village.

The region is a traditional mining area. An other tourist attraction of Perkupa is the former site of the gypsum- and anhydrite mine, where minerals can be collected. The mine was opened in 1958 and was closed in 1988 because of its uneconomical operation [13].

In the vicinity the Esztramos Hill and Szádvár can also be taken into account as important sights. The Esztramos, rising above the Bódva valley, is located in the Szalonna Karst. Its original height was 380 m, however, because of open pit mining nowdays it is only 320m high [14]. The caves of the hill were discovered by the mining activity, however, many of these caves were later totally destroyed even by the mining. The touristically important Rákóczy 1. cave has various forms of dripstones, especially helictites.

Fig. 2 Traditional house in Perkupa [16]

The 460 m high Várhegy in the administrative area of Szögliget is crowned by the huge ruins of the medieval fortress of Szádvár (Fig. 3). The date of the construction of the fortress in unknown, its first mention can be found in the document of V. István, dated in 1268. The fortress was destroyed in 1688 by the decision of the Habsburg Dynasty, it was burned up and let fate for hundreds of years. Since 1920, because it was located in the forbidden zone of the Czechoslovakian border, the unclaimed remains of the castle were perished and reconquered by the nature [15].

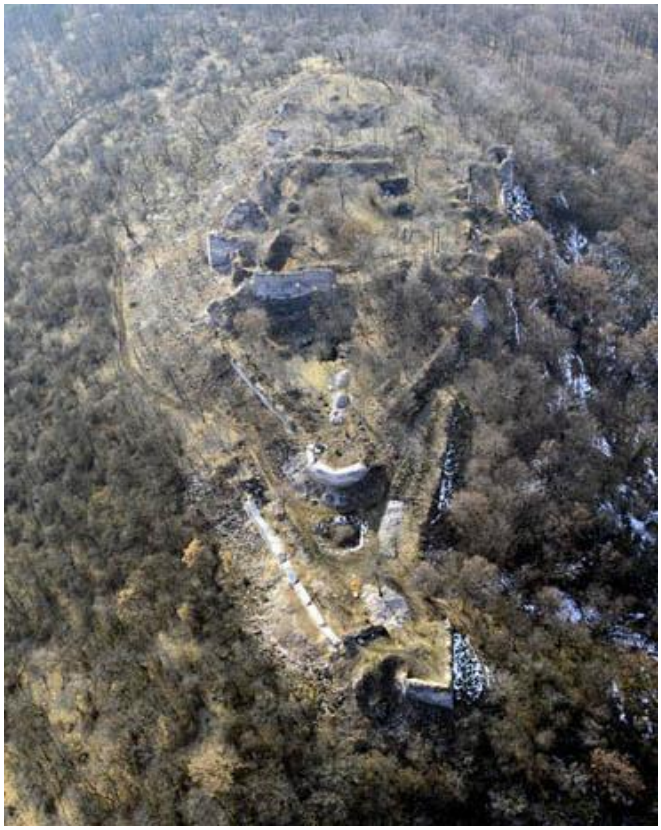

Fig. 3 Aerial photo of Szádvár's ruins [17]

GEOLOGICAL AND GEOMORPHOLOGICAL ATTRACTIONS OF TELEKES VALLEY

Walking along the bottom of Telekes valley is a travel back to the geological ages. At the mouth of the valley, the surface is covered by incompact Quaternary alluvial sediments, however, on the sides of the valley Jurassic formations can be found. On the eastern side of the mouth rises the Nagy-telekes hill. On its northern slope (Telekes-oldal), along the road No 27, the sediments of „Telekesoldal Complex" can be examined, which is characterised by gravity flow sediments, and were formed in pelagic, reductive environment. In the closest roadcut to the valley, within 200 meters, dark grey – black, siliceous marl, claystone, laminated marl, calcareous marl, grey limestone olistoliths can be found (Fig. 4.). Walking along the forest road on the left side of the valley some hundreds of metres, dark grey to black, laminated, partly nodular claystone occurs (Fig. 5.).

2,5-3 kilometres far from the mouth, there is an abandoned house, which was used by hunters. Opposite to this ruined house, 15-20 metres above the valley bottom a small quarry can be seen in the forest, where the paleorhyolite of Telekesoldal Complex was mined. Some hundreds of meters away from the house, the valley suddenly narrows to a romantic gorge. Here can be found one of the type profiles of „Telekesvölgy Complex". The valley bottom and the right side is covered by light grey, Middle-Triassic limestone of Steinalm Limestone

Formation, which was formed in lagoon-platform facies [18]. Most of the caves and the most spectacular section of the valley with the „Ördög-gát" (Devil's dam) and the „Keringő" (Whirling) were formed in this limestone formation. The Keringő is a dry, abandoned meander in the valley with the lenght of 50 meters.

The Telekes creek was forced here to change its flow direction by a very narrow limestone ridge. This ridge was cut across by a periodical tributary and the lateral erosion (and solvent effect) of Telekes creek, shortening its way and creating the rock formation called Ördög-gát (Fig. 6.). In periods with great discharge, the water flows through this dam by a small waterfall into a small pond. However, in the greater part of the year its water infiltrates under the deposits and debris of valley bottom.

Fig. 4 Limestone olistolite in gray, laminated marl and calcareous marl at the Telekes-oldal, close to the road No. 27.

Fig. 5 Dark gray laminar, partly nodular claystone in the Telekes valley.

Fig. 6 Rock formation called „Ördög-gát" (Devil's dam).

It is possible, that the whole gorge, but at least its section around the Ördög-gát was formed by the collapse of a huge cave [7]. According to Cholnoky J. [19] and Jakucs L. [20], [21] this process is as follows: the stream arriving from a non-karstic surface, reaching the karstic rocks gets into the deep through sinkholes. Running as an underground stream the water forms a cave with its erosional and solvent effect, then the water reach the surface in springs. This cave is widened by the underground stream, its ceiling is eroding continuously and getting closer to the surface. Finally the ceiling of the cave collapses. The evidences of this cave origin are the travertine formations [7], and the caves in the sides of the gorge, which were probably the side passages of the main cave [7], [22].

300 meters upwards from the Ördög-gát, on the left side, 6-8 metres above the valley bottom can be found the entrances of the longest cave, the Ördög-gát-lyuk. The bigger, oval shaped and the other, flat entrance lead into a common hall (Fig. 7.). This 8 metres long section can be examined comfortably, its wall is covered by dropstones. The end of this corridor and its left side passages are narrowing. However, the right side passage has a significant lenght, one of its side passages leads into the deepest point of the cave, while the other leads to the surface (Fig. 8).

This part of the valley is rich in karren landforms as well. Among them the rillenkarren, rinnenkarren and karren fields are noteworthy (Fig. 9). In the middle and upper section of the valley, the outcrops of Gutenstein Formation are predominant. It is built up by dark grey to black bituminous limestone, which was formed in closed lagoon (euxin) environment. In the left side of the valley, ecpecially in the tributaries, the micritic, pelagic, greyish pink limestone (Middle-Triassic Dunnatető Limestone Formation) occurs. The Middle-Upper Triassic Bódvalenke Formation is built up by light grey - red pelagic limestone [18].

Walking further, the hiking trail goes up to the ridge through the right side of the valley. At this point there is a beautiful view to the gypsum and anhydrite mine of Alsótelekes, which was deployed into the upper entrance of Telekes valley (Fig. 10).

The mine is closed nowdays, the sediments of Upper Permian Perkupa Anhydrite Formation (gypsum, anhydrite, dolomite) were formed in hypersaline lagoon environment [18]. Despite its closure, the mine can be visited by tourist, after asking for permission from the owner of the mine. In the waste dumps nice gypsum crystals could be found.

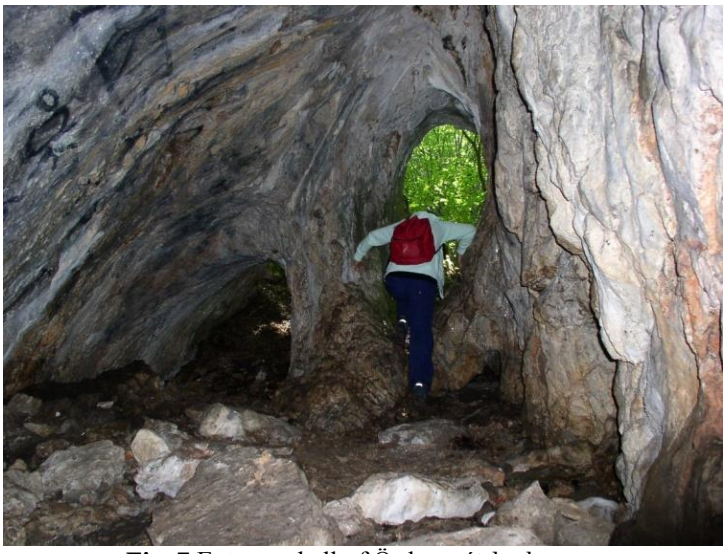

Fig. 7 Entrance hall of Ördög-gát-lyuk cave.

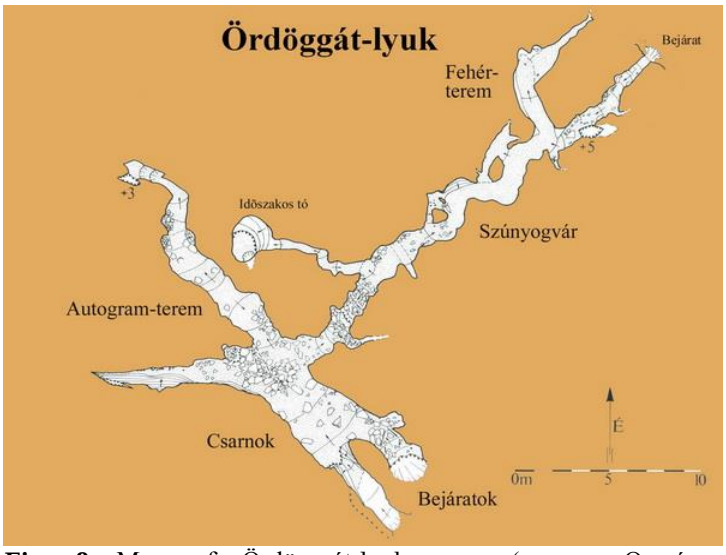

Fig. 8 Map of Ördög-gát-lyuk cave (source: Országos Barlangnyilvántartás – National Cave Register).

Fig. 9 Karren landforms in the Telekes valley.

Fig. 10 The gypsum and anhydrite mine of Alsótelekes from the Szőlő hill.

CONCLUSIONS

The area of Aggtelek-Rudabánya Mountains has several well known attractions, most of them are located in the Aggtelek karst area. Beside these famous sights, the southern part of the region also offers spectacular places to visit. The Telekes valley, because of its geographical, geological and geomorphological settings, specific landforms and rock formations offer memorable trips for geotourists. The traditional mining settlements near to the gorge like valley of Telekes creek (especially Perkupa, Alsótelekes, Szádvár) can be potential destinations for both inland and foreign guests as well.

Acknowledgement

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GEOLOGICAL DIVERSITY IN SELECTED BORDER AREAS OF SLOVAKIA AND UKRAINE AND ITS POSSIBILITY FOR THE DEVELOPMENT OF GEOTOURISM

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ABSTRACT
The article is focused on description of the geological diversity in specified border areas of Slovakia and Ukraine. Specifically - region Dolný Zemplín (Slovakia) and region Transcarpathia (Ukraine). In these countries belong these regions to the poorest ones. On the other hand, it is characterized beside the others also by rich and diverse natural potential. Therefore, they have a great potential and reserves for development in tourism. On both sides of the border is tourism considered as promising sector to stimulate regional development and encourage mutual inter-regional cooperation. In each of these regions is achieved different level of civilizing development in economic, cultural, legislative area etc. For this reason there are till today outstanding issues related to the valuation and indexation of all geological objects (such as holders of tourist offer) as well as the issue of sustainable protection of natural heritage by creating a network of Geoparks. The aim of the article is to define the essence of the value of the natural heritage of the region, particularly its geological diversity and its usability in geotourism and assess the associated positive and negative anthropogenic impacts on geological diversity which are demonstrative also in the social sphere of the culture, science, training, education and as well the economy (in the first place Mining/Board of Mines).

Keywords: Geological Diversity, Geological Objects and Geotourism

INTRODUCTION

It is very difficult to imagine our planet Earth as a monolithic entity. As significant is biodiversity, it is equally valuable geodiversity, which is an underlying for all living things. Geological evolution, geological diversity and geomorphology are part of the natural heritage of our planet Earth as a perfect area of diversified composition. Murray Gray (2008) defined the geodiversity as a "range of geological, geomorphologic and soil characteristics". The term “geological diversity" was first used in 1993 as a geological equivalent of biodiversity, containing different types of rocks, minerals, fossils, relief formations, underground structures and buildings, as well as the processes generated during the geological periods (Gray, 2008). Geological diversity is an important natural factor determining the biological, cultural and landscape diversity with which is associated whole historical development of nations and their everyday existence and activities (e.g. mining).

Achieving a balance between cultural and natural realities (and abiotic components) is one of the key issues of global organizations working to protect the cultural and historical heritage and the environment. Understanding the importance of geological diversity should also be based on local and regional policies and their conceptions (Jones, 2008). Europe consists of many countries with the legislation, which currently have well-developed policies and procedures for the protection of geological heritage. One of the forms of protection and the increase of geological heritage promotion, the possibilities of scientific research, public education in the field of Geosciences, the ability to manage economic activities related to tourism (Geotourism), and ensure sustainable development in certain area, is the establishment of the Geoparks, representing not only a remarkable geological formation but even the archaeological and cultural value.

The main impetus for their establishment is Geotourism, which highlights the geological, cultural and aesthetic character of spots, historical and technological development, social relationships and habits of the local population while revitalizes socio-economic development of the community. Geotourism can be a powerful tool for sustainable development, but if not effectively managed, may pose a direct threat to the conservation of the natural geological and cultural heritage (Fisherman et al., 2010; Newsome et al., 2012). The main objective of this

article, on basis of the field research and the summarization of the theoretical and empirical findings of the authors who are working on the topic, is to explore possibilities of creation of Geoparks with the identified Geo-objects in the region of Dolný Zemplín, Slovakia, and Transcarpathian region of Ukraine and theirs exploitation in Geotourism. Since, that the establishment of the Geoparks and its functioning have also as an aim "stimulate economic growth in the region where they are located", it would be necessary to develop Geotourism, as a modern form of tourism, in these regions more. Potential gain from (Geo) tourism in the region is shown in Fig scheme 1.

In the present paper it is necessary to talk about Dolný Zemplín like about the proposed Geopark in accordance with the concept of Geoparks[5] of Slovak Republic (Klinda, 2008).

DESCRIPTION OF THE AREA OF INTEREST

Dolný Zemplín (Trebišov, Michalovce and Sobrance districts) in Slovakia and Transcarpathia (Uzhgorod, Mukachevo and Berehovo districts) in Ukraine are among the poorest regions of these countries. On the other hand, both regions are characterized by a rich culture and history, but above all by considerable natural potential. They have thus great potential and reserves for tourism development. Tourism is considered on both sides of the border as only one promising sector for regional development and cooperation.

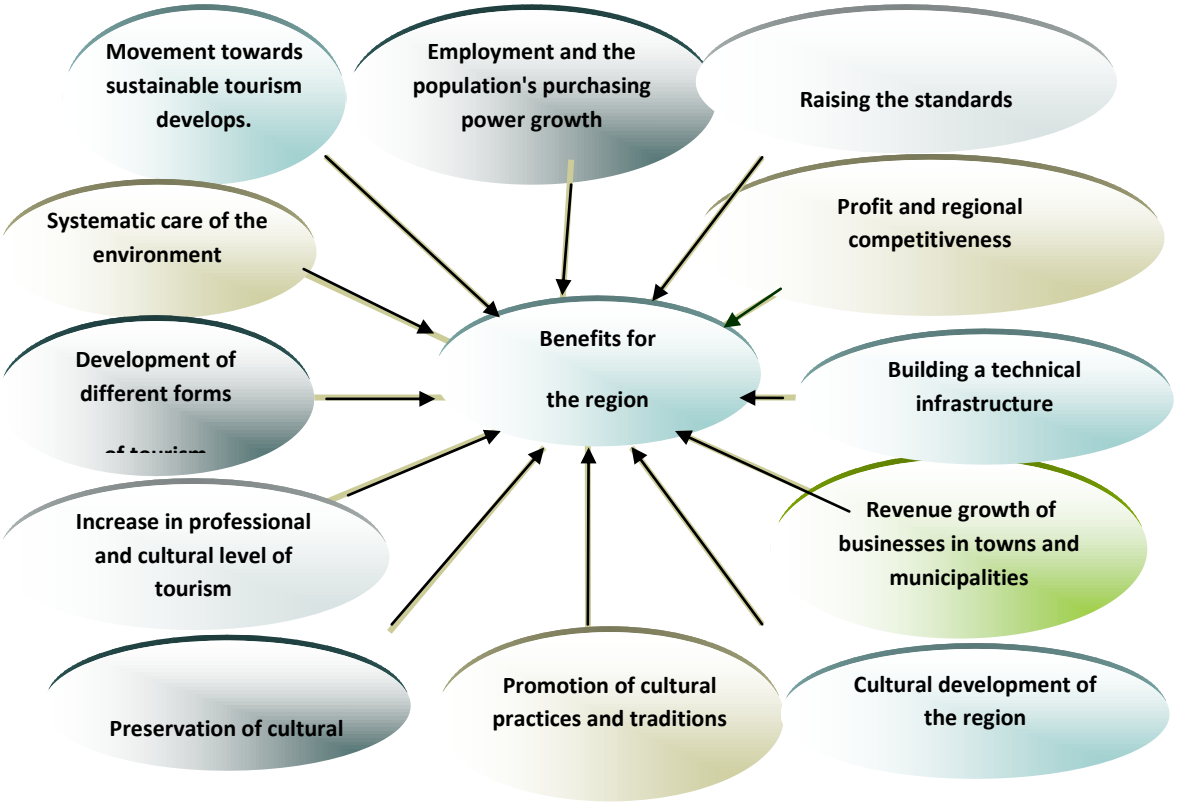

Fig. 1 Scheme benefits for the region in terms of tourism (Geotourism) development

[5] One of the proposed Geoparks is “Zemplínsky Geopark”, the submitters are M. Kaličiak and V. Konečný (Klinda, 2008).

Each of these regions according functional criteria of the border areas achieved varying degree of development[6], considering the territorial size and internal resources. It manifested itself at different degrees for example in unemployment, in number of the population living in the territory of the municipality, in the county revenue or applying of regional state policy, competitiveness within the country and others.

Described regions are visited mainly for wine tourism, shopping tourism, recreational bathing and rural tourism (these are also the major types of tourism in both regions) with different options of additional types and forms of tourism (e.g. picking berries with possibility of conservation, collection of medicinal plants and its drying, fishing, hunting, horseback riding, sheep breeding, production of milk, cheese, vegetables and fruit picking, viticulture production, wine tasting, livestock breeding, life in the country house, crop harvesting…) . It must be said that unlike Dolný Zemplín, Transcarpathia is still known thanks to spas and possibilities of winter sports and recreation in the Carpathians. Unquestionably, it is necessary and interesting to note the geological heritage and diversity of these territories. Although it is not the paramount objective of tourist interest, geological offer attracts more tourists, foreign as well as local while raises awareness of the environment and its protection.

Fig. 2 Map of Dolný Zemplín and Transcarpathia (www.1, modified)

[6] From 1 May 2004 the Slovak Republic is a member of the European Union. From 21 December 2007 a member of the Schengen area also. This allows economic integration, freer movement of people between both states and regulation of protection of the common external borders. From this perspective mutual cooperation is based on the attitudes and policies of the European Union towards Ukraine. This gave a new impetus, whether negative or positive, to cross-border cooperation and cohabitation.

PRIMARY OFFER OF DOLNÝ ZEMPLÍN REGION AS A BASIS FOR THE DEVELOPMENT OF GEOTOURISM

Dolný Zemplín[7] region is located on the southeast of Slovakia. It is the easternmost region of Slovakia and is part of the Košice region. Region is located mainly on the Eastern Slovakia plains with plenty of water areas. In the east it borders with Ukraine and in the south with Hungary. From the north it is bounded by beautiful panorama of Vihorlat Mts. underneath which water of Zemplínska Šírava dam is mirrored. On the west rises Slánske Hills and the plain is concluded by Tokaj Hills (Ďurovčík, 2007). "The contrast between the plane passing to the uplands which are growing up to the ridge of Slánske hills and Vihorlat offers beautiful scenery" (Ďurovčík et al., 2009).

Diversity of nature and landscape of Dolný Zemplín led to the establishment of a number of large and small protected areas: Landscape parks (CHKO) Vihorlat and Latorica, protected bird reservation Medzibodrožie. Among small-protected areas are noteworthy Zemplínska jelšina near Brehov village, Kašvár near village Viničky, Kopčany Saline in Kopčianské Kľačany, “Raškovský luh” Woods, National wildlife reservation Tajba situated in the village of Streda nad Bodrogom, Senianske Ponds and “Tarbucka” locality. Well known recreational area around the dam Zemplínska Šírava (subregion) is one of the warmest areas in Slovakia. A large number of tropical days and nights made of it the second largest recreational water area in Slovakia. Zemplínska Šírava was and is the tourist site of international importance (Ďurovčík, 2007; Ďurovčík et al., 2009). Numerous small rivers, water canals, reservoirs, ponds, lakes, underground waters form waters of Dolný Zemplín and mineral springs. The region has ideal conditions for easy and comfortable walking, fishing, Zemplín Rivers rafting and water sports. For Zemplín is typical fan-shaped river system (Ondava, Latorica, Laborec, Topľa and Trnavka), which falls within Bodrog river basin and drainage area of Black Sea. Important role in tourism development in the area play natural lakes Morské oko under Vihorlat in Sobrance district, Izra at the foot Slánske Hills and Vinné. The region could be used also in terms of spas but now the mineral springs (around Sobrance, Michaľany, Byšta and Veľaty) are not exploited commercially. Area of Eastern Slovakia planes is also perspective because of the occurrence of thermal waters (www.4).

The proposed Zemplínsky Geopark is located in Zemplín Hills and around. There are examples of rock complexes from Paleozoic to Quaternary, marked by mining activity. The area is enriched with cultural values and traditions of Tokaj winemakers who didn’t use, within cooperation with relevant municipal authorities, the opportunity to present the region still (Klinda, 2010).

Geological characteristics of the described area are based “on the construction of tectonic units of very wide stratigraphic range, from the oldest rocks in Slovakia (Precambrian) to the youngest Quaternary drift sands (eolic sediments) of Eastern Slovakian Plane" (Ďurovčík et al., 2009). Deposits of minerals are richly represented: obsidian (in villages Viničky, Malá Bara, Veľká Bara, Streda nad Bodrogom, Cejkov, Hraň and Brehov), chalcedony (in the municipalities Brehov, Brezina, Byšta, Čerhov, Slanec and Veľaty) agates (in the village Byšta), marekanits (called volcanic glass, consisting of perlite and obsidian, found in an abandoned quarry in the village of Streda nad Bodrogom), bentonite (in municipalities Kuzmice and Lastovce), anthracite (in Zemplín Mts. in Tŕňa Fm.), topaz and corundum (in Kapka locality) (Pauliš & Ďuďa, 2002; Ďurovčík et al., 2009). Variety of geological structure is also reflected in Podhoroď - Beňatina, which occurs several geological units: Outer Flysch

[7] "Difficult territory with a mixed ethnic composition. It was built almost entirely on agriculture, which from there disappeared. There is minimal possibility of jobs (nearly 40% unemployment rate in the Košice Self-Government Body). But ultimately, this region has a chance in the future with the help of tourism development" (www. 2).

Zone, Klippen Belt area and Neogene volcanics. The oldest rocks in Slovakia, which are andesites and rhyolites, are located in the village Byšta.

Fossils occur in the Carboniferous rocks of Veľká Tŕňa and Clippen Belt. Another attraction is the geology and topography of Klippen Belt and Neogene volcanics in Beňatina Clippe and geomorphology of sand dunes in Medzibodrožie. To diversify the tourism offer, especially for geotourists, is possible with use of landmarks after old mining activity (mining of obsidian, copper ore and anthracite) and with the observation of varied forms of fauna and flora, especially in Zemplín Hills (Ďurovčík et al., 2009).

Cultural and historical potential of the region is concentrated mainly in the district capitals. Tokaj wine region is greatest potential of Trebišov district. It is the smallest and also the most attractive viticultural region of Slovakia comprising villages Bara, Čerhov, Černochov, Malá Tŕňa, Slovenské Nové Mesto, Veľká Tŕňa and Viničky. Declaration of the region was based on years of research of soil and climatic conditions to entry into the World Heritage List (www.3).

Folk culture in the region continues until today in the dialect, architecture, gastronomy, traditional clothing, habits, rituals, folk songs, the relationship to soil or traditional hand craft. For example in the village Pozdišovce, 3 km west of Michalovce, with an ancient tradition of pottery is still a ceramic production. Folk architecture represents wooden churches in the Ruská Bystrá and Iňovce (Ďurovčík, 2007).

PRIMARY OFFER OF TRANSCARPATHIAN REGION FOR THE DEVELOPMENT OF GEOTOURISM

Particular attention in this paper aims to border district of Uzhgorod, Mukachevo and Berehovo because of the size of the Transcarpathian region as such compared with the region of Dolný Zemplín.

Region is located on the territory of so called Ruthenia in western Ukraine. Regional center is Uzhgorod. Other important towns are Mukachevo, Chop (center of traffic infrastructure), Berehovo and others. The area is located in the Ukrainian Carpathians and is an important tourist and transport part of Ukraine with lots of ski and spa resorts in particular. Region represents a border territory (Transcarpathia borders with four EU member countries). Defined border area is located in the southwest of Ukrainian Carpathians and on the adjacent to them Transcarpathian lowland which is part of Pannonian Basin. On the west neighbors with Slovakia, with Hungary to the southwest and north and east is bounded by volcanic ridge (Vihorlat Gutín - Mountain Range, 700 to 1,000 meters above sea level, created before 12 million years due to andesites volcanism), which is within Ukrainian Carpathians southernmost (Paňková, 2003). Transcarpathian climate is humid, continental and that's why is the summer here slightly warm and the winter moderately cold.

Varied natural heritage in Mukachevo district is protected by declaration of 20 protected natural territories and objects, one of which is also of national importance - the Carpathians. There are another 21 objects in Uzhgorod district: e. i. Velyka Dobron reservation, Antalivska polana, Nevyckoe volcanic crater and Sosna Corna. In Berehovo district was identified a total of 24 protected objects: e. i. Prytysiano Park, Zaluzh, Ardovo, Silash, Kosonska Mountain, Bihanska Mountain (Zink & Shevchuk, 2008). Relief shape is highly affected by the Tisza River, which originated at the confluence of the White and Black Tisza. On the territory of Transcarpathia this river reaches 223 km and its basin make up all the rivers of the region. Further inland waterway network comprises rivers Latorica, Uh, Borzhava, Serna, Viznyca, Obava, Sinyavka, Water channel Koropecky, Verke, Čorne Marsh, Syne Lake, Skakalo Waterfall and many small creeks (www.5).

There are sixty spa facilities in the monitored border area. The spa industry in the Transcarpathian region has its long tradition and popularity not only among domestic visitors but foreign tourists come here from all over the world. In Uzhgorod district are the springs

containing the same type of water saturated by carbon dioxide, iron and silicates, low mineralized. These waters are known as "Nastusia". In Mukachevo district are well known mineral water called "Polana kupil" and "Karpatska". Properties and chemical composition of water: carbonic, boric, moderately mineralized cold water. In Berehovo district except mineral water springs are recorded thermal water containing amount of iron. This type of mineral waters is used in the famous spas "Casino", "Zhajvoronok", "Nod - Erdev" and others. Under almost the entire area of the district Berehovo is "thermal sea", according to geologists. The temperature at the exit to the surface reaches 18-80 °C; the depth of wells is about 800 meters. Such springs were also found in New Zealand, Iceland, Kamchatka and Sakhalin (Versta - Yadlosh et al., 2009).

Thanks to the complex geological evolution the territory of the region has a lot of natural resource deposits, which greatly promoted the development of mining in the past. In the Transcarpathian region have occurrence rich deposits of minerals: basalt, tuff, sandstone (in Uzhgorod district), ore (in the Volcanic Belt of Berehovo district even gold, polymetallic, kaolinite and alunite deposits), barite, alunite, coal, perlite, construction materials (in Berehovo district), andesites, rhyolites, basalt, refractory clays for ceramic production (in Mukachevo district) (Habčák, 2009).

In terms of Geotourism most interesting attractivities in Uzhgorod district are Zamkova Mt., Voročivśki skeli Rocks, Antalovecki skeli Rocks, historic wine cellars (located in the village Serednje and originated from the 16th century, carved in volcanic tuffs), historical iron ore gallery from XIV century (Hal'arska dira), Radvan Outcrops (these are outcrops of black andesites - basalts of Neogene (2-7 MA), which are located on the left bank of the river already (city Uzhgorod). In Mukachevo district can be admired: mountain blue rock outcrops (in the top part of the Bus mountain near the village Sinjak is cluster of bluish - gray andesite of Neogene), Klenovec Outcrop of columnar andesite (andesite - basalts in this area have typical basaltic jointing). Skakalo Waterfall (waterfall was created at the exit of volcanic rocks on earth's surface), Mukachevo Mt. (that includes Mukachevo castle), chain of volcanoes close to the villages Velykoj Dobron, Drysyny and Shalanok. Berehovo district is known as a mining site of kaolinite ("Kuchlja"). There is also Didovo Lake (the remains of mining) and Muzhijevsk polymetallic deposit (it is said that at this spot Celts, Romans and Turks mined the gold) (Ziňko & Shevchuk, 2008; Paňková, 2003; Habčák, 2009).

Cultural and historical potential is represented by a rich sacral culture. Beside it there is a Nevyckoe Castle, Uzhgorod Castle-fortress (dates from the 10th to 16th cent.), Palanok Castle, hunting lodge Schenborn, Tchinadijevo Castle and others. Thanks to multicultural composition of the population rich folk culture of the region is now one of the main offers of Transcarpathia in terms of tourism development.

CONCLUSIONS

In recent years interest in Nature, both biotic and abiotic, is growing. Tourism has become a global phenomenon. Within the tourism industry there are organized numerous field trips to major and minor geological phenomenon on the Planet. Slovakia or Ukraine will not be the exception. It is a combination of elements that increase the sense for specifics of place or locality. Or, for its potential in other words. It is said that the potential is comparable to the talent. Not always the most talented are the most successful. It means that the potential may or may not be exploited. The point is in versatility and specialization, but high potential in tourism for its certain forms is particularly significant. The issues of Geotourism currently in Ukraine, unlike the Dolný Zemplín region in Slovakia, are in the phase of research and development mainly on a theoretical level. But is necessary to say that there are many experts dealing with the issue and there are a number of quality researches and publications. New publications describe concrete proposals on the use of the locations for the establishment of

Geoparks and Geotourism. There are prepared thematic geological and geomorphologic excursions for cohesion of knowledge in the field of geology, geomorphology archeology, history and culture. Still is not solved completely the issue of creating of a list of all objects meeting the criteria for geological respectively geomorphologic objects and that are carriers of a tourist nature at the same time. Similarly, issue of sustainable protection of natural heritage is pending. After an analysis in the present paper is proposed list of Geotourism objects. Some objects are in the state of degradation, they face even complete extinction. It is necessary to more elaborate the question: When the protection is necessary? What kind of protection and where to implement it? In what mode of protection it is necessary to operate Geo-bid?

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TOURISM DEVELOPMENT IN POLONINY WITH POSSIBILITY OF CONNECTION TO MALOPOLSKA COUNTY

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ABSTRACT
The presented paper describes in details history, interior and exterior of wooden churches which lie in northern Slovakia and in southern Poland (Malopolska county). Even if it was signed cooperation between Slovakia and Malopolska county, there not exist any mutual cultural trail or route which will join many of wooden churches that are in mentioned area. In Slovak republic there is Gothic route, Mining route, even Route of health and beauty in Presov region, but official route of wooden architecture and churches is not so much promoted. In Poland is situation better and there „wooden“ route is presented in higher level. Article is dedicated especially to cooperation between these neighbour countries and cross connection of wooden churches routes of selected area. All of these churches are part of UNESCO World Heritage. Article systematizes and deals with possibilities of tourism development and promotion not only of wooden architecture but also of beautiful nature and surrounding of trans-border area.

Keywords: Malopolsko county, wooden churches, cultural trail, trans-border cooperation

INTRODUCTION

Slovakia officially signed Cooperation Agreement with the Malopolska county on 14 October 2003 in Lubomirski Palace Hall (Lubovniansky castle) in Stara Lubovna. Five of the eight UNESCO sites in Slovakia lie in Prešov region. In this territory extends five national parks and 180 protected areas. It has nearly four thousand cultural relics.

As well as in Malopolska county, which adjoins the south of Poland in the Prešov Region, are perfect terms to tourism development. There is a path of wooden architecture of more than 250 objects, among which are the temples of the ancient UNESCO World Heritage site. Forward is the second city of Krakow, salt mine and the county lock in Wieliczka salt mine in Bochni, German Nazi camp Auschwitz-Birkenau, Marian sanctuary in Kalwaria Zebrzydowska, as well as a number of spas and ski resorts.

Unusual promotional caravan trip was invented by Cultural Institute of Malopolsko. This trip should bring benefits to all countries, which will “Malopolski” caravan pass. It will encourage people to visit Poland, but also want to draw the attention of travelers to the beauty and interesting history of other European countries against the background of major landmarks. Promotional caravan is passing these days (September 2013) Slovakia. Caravan promotion could be used by Slovak republic in reverse.

Cross-border cooperation aimed at promoting tourism in Central Europe already has several years of tradition. One of the last projects that implemented jointly Prešov Region and the Institute of Europe of the Carpathians Malopolska Province was supported by the European Union. Its aim was to promote tourist attractions of the approximately two hundred thematic routes passing Slovakia-Polish borderland. The output of this project is www.karpatskamapa.sk website that informs its visitors about tourist destinations, but also about upcoming cultural events in the two partner regions.

WOODEN CHURCHES IN LESSER POLAND COUNTY

The wooden church style of the region originated in the late Medieval, the late sixteenth century, and began with Gothic ornament and polychrome detail, but because they were timber construction, the structure, general form, and feeling is entirely different from the gothic architecture or Polish Gothic (in stone or brick). Later construction show Rococo and Baroque ornamental influence. The form of these Roman Catholic churches is deeply

influenced by the Greco-Catholic and Orthodox presence in the region. Some display Greek cross plans and onion domes, but the most interesting of the churches combine these features with the Roman forms with elongated naves and steeples [2, 11] .

Gothic church of St. Michael Archangel (Debno Podhalanskie)

The first church is located in Debno Podhalanskie and it was built in 13th century, but only the building from 15th century has remained till today. The interior design of the church is a unique combination of Gothic art and highland folk tradition. The sculptures were made by a local artist, Jozef Janos.The legend says that the church was built by highland robbers, to whom St. Michael Archangel revealed himself on the oak tree.

The church, together with other wooden churches in southern Poland and the Podkarpacie region, was listed on the UNESCO List of World Heritage Sites [11].

St. Leonardo's cemetery church (Lipnica Dolna)

It was built at the end of 15th century using larch wood in place of an old church. It has been preserved until today in an unchanged form and it is one of the most valuable wooden Gothic buildings in Poland. Inside the church visitors may admire the treasures of medieval painting and sculpture. Special attention should be paid to the triptych depicting St. Leonardo, and side triptychs presenting the adoration of the baby Jesus and St. Nicolas. The wall polychromes and ceiling paintings depicting numerous biblical scenes also enrapture visitors to the church. St. Leonardo's Church is also listed by UNESCO as one of the World Heritage Sites [9].

Wooden Church in Sêkowa

The wooden Roman Catholic church of St. Philip and St. Jacob the Apostles, built in 1520 and expanded in the 17th century, is striking for its remarkable construction with external arcades running along all the outside walls of the building. The church is located by the Sêkówka River, between two villages: Siary and Sêkowa. It is one of the most beautiful churches in the Subcarpatian Region [2, 6].

Fig. 1 St. Leonardo's Church [8]

Church is made of larch wood in a Gothic style, and is characteristic for it's framework constuction. The double-shingle roof is very steep with a triple presbitery and a cross on top. The presbitery and the aisle share the roof. Above the aisle there is a tower for ave-bell and an iron cross. There is a similar cross at the top of the tower. It was added in the 18th century as the last element of the church. The roof, which sticks out of the church's main body all around, is supported by columns of 1.7 m (that part of the roof is called "sobota"). It was meant to protect the weakest parts of the wooden building (the foundations) from water. Later, it was also a place where pilgrims, who did not manage to go inside, could hide. The original name "sobota" means "Saturday" in Polish, and the explanation is simple: many people lived so far from the church, that they had to come here on Saturday and spend the night here, if they wanted to take part in a Sunday mass [10].

This church has been designated UNESCO World Heritage Site (Wooden Churches of Southern Little Poland). In 1994 the church was awarded (together with the Orthodox church in Owczary) a prestigious Medal of Prix Europa Nostra in the Hague [9].

Haczów Church of the Assumption of Holy Mary and St. Michael's Archangel (Haczów)

The oldest wooden church in Poland is Haczów Church of the Assumption of Holy Mary and St. Michael's Archangel. This beautiful structure most likely was built in 1388.
Soon after the establishment of village here was built large church from locally available material: wood. Most likely date of its construction - 1388. Church is the largest Gothic wooden church in Europe up to this day. Church was constructed in the time of Gothic style and its adornment follows the rules of this style [4].

Next to the church was located the traditional medieval churchyard. Archaeological research shows that people were here buried already in the late 14th century and early 15th century, burials continued up to the closure of graveyard in 1772.

Initially the church did not have tower. Large, 25 m tall tower in Baroque style was built in 1624, when some more modifications were done. In 1784 - 1789 church got some more additions. Before the World War II there was built a new church next to the old one and since 1948 services are held in the new church.

Extensive repairs of the old church were done in 1999 - 2000, shingles were changed in 2006, when the dark church turned into light, cheerful building [9].

Fig. 2 Church of the Assumption of Holy Mary and St. Michael's Archangel [2]

St. Michael Archangel's Church (Binarowa)

This Gothic church was built in 1500 and it is one of the oldest wooden churches in the region of Małopolska . It is decorated with numerous sculptures and paintings of angels, which makes it a magical place. Precious figures of the Mother of God and of several saints, dating back to 14th century, are also located in the church. Special attention should be paid to the Guardian Angels' Chapel, added in 17th century, as well as to the wall polychromes depicting biblical scenes. Since 2003, the church in Binarowa has been included on the UNESCO World Heritage List [11].

WOODEN CHURCHES IN NORTH-EASTERN SLOVAKIA

The wooden Greek Catholic church of St. Michael's Archangel (Topoľa)

Greek Catholic wooden church in Topoľa was built around 1700 and dedicated to St. Michael the Archangel. The church doesn't serve for regular services. Iconostasis (National cultural monument) shines with its variety of colors. It has architecture of four rows with icons displayed on four levels. It is dated to the middle of the 18th century. Deaconal doors have no leaves. Royal doors have two leaves and are adorned with six medallions of Evangelists and the Annunciation. In the first row are placed the icons of St. Nicholas, Theotokos (Hodigitria) Christ the Teacher and icon of St. Michael the Archangel. Second row of feasts has the icon of the Last (Mystical) Supper in the middle. Third row contains the icon of Christ the High Priest with Theotokos and St. John the Baptist in the middle. Fourth row is so called row of prophets. In the middle is Christ on red three-barred cross with the Theotokos and St. John the Evangelist on the sides. Belfry (National cultural monument) – Part of the area is also independently standing wooden belfry, built in 20th century [1, 3].

The wooden church of St. Michael the Archangel (Russký Potok)

In the middle of the village Ruský Potok was in 1740 built originally Greek Catholic wooden church. Its patron is St. Michael the Archangel. From the 2000 was the church transferred to the Orthodox Church. From construction point of view this is a church with three parts, three spaces, two towers and two crosses. It is built on stone foundation. Structure of the church is classical rustic, the tower, narthex and nave have columned structure. Belfry in the southern part of the church is not original; it was built only in 1956. Inside are three bells, from the belfry in the tower [5].

Fig. 3 The wooden Greek Catholic church in Topoľa [Photo by author, 2012]

Fig. 4 Church and belfry in Ruský Potok [Photo by author, 2012]

Iconostasis in the church has architecture of four rows displayed on four levels. Probably it comes from the 18th century. First, main row consists of icons of St. Nicholas, Theotokos (Hodigitria), Christ, and St. Michael the Archangel, or better said Synaxis of St. Michael. Deaconal doors have no leaves. Royal doors with two leaves are adorned with six medallions (four Evangelists and two medallions of the Annunciation). On the jambs of the royal doors are the icons of St. Basil the Great and St. Gregory of Nazianzus [1, 7].

The wooden Greek Catholic church of St. George (Jalová)

In 1792 on a slope above the village Jalová, the church was built small, but adequate for the number of faithful for Greek Catholic church. It was dedicated to St. George the Great-martyr. It was enlarged already in 1831. This church belonged to so called "churches in a fur coat", it was plastered from outside, and whitened, and thus devalued. Other renovations took place in the church in 2002 and church was completely renovated, but not plastered.

It is a church of rustic structure, based on stone foundation. From the architectural point of view this is a classic, church with three spaces, three parts, two towers and two metal crosses. There is only one entrance, from the western part. In the main tower are two bells. One is from 1908; second one was re-cast in 2001 [3].

Iconostasis has architecture of five rows with icons placed on five levels. It is dated to the 17th century. First row consists of four main icons: St. Nicholas, Theotokos (Hodigitria), Christ and St. George the Great-martyr. Curiosity of the iconostasis is the fact, that main icons are placed upright on the iconostasis, because of the space reasons. Deaconal doors have no leaves [7].

CONCLUSION

When strolling through the recesses of the Polish- Slovak border all types of tourists will find what they are searching for. There are attractions for sports -oriented tourists, nature lovers, history, rural tourism, thermal springs, traditional folk culture and not least supporters of regional gastronomy. Selected routes of Presov region and Malopolska region are also attractive for ornithologists and people who want to learn more about the natural and traditional medicine.

From the beginning Presov region and Malopolska county are working on creation a more interesting brand for tourism development in both partner regions. Tourists can visit the

unique area of the Carpathians , which promotes two countries and experience many interesting, even on only few tens of kilometers long route.

Content site web portal www.karpatskamapa.sk is constantly updated with new tourist destinations, but also planned cultural events in both partner regions . Information about them can be added to the web and the public and to gain access to the administrator or filling out a web form. Website also offers the possibility to download maps for navigation for tourist destination through GPS devices and pasting photos or videos by tourists when they made their trips around the Carpathians. These webside is missing more information, photos and description of wooden architecture of this trans-border area.

Prešov Region of a joint initiative with the Polish site promises to kick-start tourism in these areas of Poland and Slovakia . " We expect also that the project, as well as the portal itself, re- stimulate interest from Polish tourists about slovak destinations . Following the introduction of the euro was depressed because of traffic , you still feel many actors and institutions in border regions , " said the spokeswoman TASR PSK Veronika Fitzeková.

Project Carpathian map of options is funded by the EU in the CBC Programme of Poland-Slovak Republic 2007- 2013. Its output is mentioned portal , professional conferences but also the amount of publicity, materials , brochures and studies , which appeared in several languages. The implementers of the project said they want in future to engage in promoting tourism in cross-border cooperation also other Polish and Slovak regions.

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GEOPARKS IN THE WORLD (HAUTE PROVENCE GEOPARK, CHAPADA DIAMANTINA GEOPARK, HONG KONG GEOPARK, LESVOS PETRIFIED FOREST GEOPARK, COPPER COAST GEOPARK AND GEOPARK NATURTEJO)

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ABSTRACT
The main objective of this article is to present geoparks in the world. In the first chapter is defined the term "Geotourism". The second chapter deals with selected geoparks in the world, namely: Haute Provence in France, Chapada Diamantina in Brazil, Hong Kong geopark, Lesvos Petrified Forest geopark, Copper Coast geopark in Ireland and the geopark Naturtejo in Portugal.

GEOPARK

A Geopark is an area with an expressed geological heritage and a strategy for a sustainable economical development, and the promotion of that very development to the benefit of the local community. The Papuk Geopark is a part of the European and Global UNESCO Geoparks Network, whose main goals are protection, education and a sustainable development (Geotourism, 2013).

GEOPARKS IN THE WORLD

Geopark Haute Provence

The Natural Geological Reserve of Haute-Provence, home to the GeoPark, was founded in 1984, pursuant to the 1976 Law on the protection of Nature to preserve palaeon-tological deposits from looting. The prime tool for such protection was, and remains, educating the public of the value of the geological and palaeontological heritage, rather than repressive measures, although strict enforcement of regulations remains an inevitable necessity. At the start, only 18 rather limited sites were protected, but, over the years, pursuant to the Law, a peripheral zone was created, with less stringent constraints, but ensuring proper conservation of the geological heritage. Founded in 1989 with 36 communes around Digne-les-Bains, this protected area today covers 2,100 square kilometers and 55 communes in two départements (Alpes de Haute-Provence and Var). Overall, in this vast territory, no fossils may be collected. Only professionals and recognized amateurs may obtain special permits for scientific purposes. Raising public awareness has taken two directions: addressing the territory's inhabitants with special emphasis on local schools and events in villages, on the one hand, and targeting visitors through discovery trails and museums, on the other. Raising awareness among the territory's inhabitants has led to their appropriation of this forgotten heritage, since fossils have always been part of the local people's traditional life. Education of the public at large led to a genuine development strategy for tourism based on the local geology and palaeontology. By 1996, with support from the European Leader II programme, an action plan for the development of geotourism was started, in particular, the preparation in stages of three heritage trails: Hautes Vallées de l'Asse (Upper Valleys of the Asse River), Massif du Blayeul (Blayeul Massif), Route du Temps (Road of Time). In this context, many sites were developed into in-place museums, including sites revealing fossil sirenians, ichthyosaur, abundant ammonites preserved on a single slab of rock, bird tracks, and other interesting occurrences (Pages, 2009).

Fig. 1 Haute Provence (Pages, 2009)

Chapada Diamantina, Brazil

The Chapada Diamantina region comprises a group of mountains, plateaus and karst reliefs located in the center of Bahia State, north-eastern Brazil, occupying an area of around 65.000 km2, in the middle of the São Francisco craton. This region is constituted by low-grade metamorphosed volcanic and sedimentary siliciclastic and carbonate rocks from the Proterozoic Eon. These rocks are stratigraphically divided into four groups as follows: Rio dos Remedios Group (Paleoproterozoic), Paraguaçu and Chapada Diamantina Groups (Mesoproterozoic) and the Una Group (Neoproterozoic). The Rio dos Remédios and Paraguaçu groups were deposited inside an aborted rift valley and the Chapada Diamantina Group, as a sag basin. The set is shaped as a “bovine head” basin and exhibits nowadays an average thickness of more than 1.000 m. (Pedreira, 2007).

During the 18th and 19th centuries, the mining of gold and diamonds was the main economic activity at Chapada Diamantina. With the depletion of reserves, most of the population migrated away. Nowadays, tourism and an intensive farming raised the local economy, converting the region in one of the major nature tourism destinations of South America. Although the main tourist attractions are represented by geosites (waterfalls, caves and canyons), most of the tourists do not have the perception of their scientific or didactic relevance, as Earth Sciences are not a very popular topic in Brazil. Considering that the geological heritage is already the main touristic attractiveness of Chapada Diamantina, which brings most of the tourists to the region, one could say that the present tourism activity in the region could be considered as geotourism. Nevertheless, there is a lack of interpretative information available to visitors and no coordination to ensure geosites management. The strategy to implement and handle the geotourism at Chapada Diamantina should integrate the guidelines to protect the geological heritage and the production of interpretative materials about the geosites, aiming to raise the visitors’ awareness about the evolution of the regional landscape and Earth history (Pereira et al, 2009).

Fig. 2 Chapada Diamantina (Chapadla Diamantina, 2013)

Hong Kong geopark, China

The development of geotourism through the Hong Kong Geopark in China is one of the first geoparks in the world to be established in a densely populated metropolis (Ng et al, 2010). It illustrates the concept that geotourism can occur in urban areas just as appropriately as in natural areas. In order to fit into the unique geographical and urban contexts of the Hong Kong, the geopark has been designed and planned according to a unique set of principles. A key priority is the development of resources to promote geological conservation and education. To support this approach and to make geology more easily accessible and understandable to the public, an integrated interpretation system is being introduced. The systém comprises different types of geological interpretation across five levels from easy (level 1) to expert (James & Hose, 2008). This material and information caters for visitors of different backgrounds and is currently available from the web or in the publications of the Hong Kong Geopark (Dowling, 2010).

Lesvos Petrified Forest Geopark, Greece

The island of Lesvos, situated in the northeast Aegean Sea, is the third largest island in Greece at 1,630 sq km. On its western side that one can find the Lesvos Petrified Forest Geopark, the very first Greek geopark, comprising large accumulations of exposed fossilized tree trunks. A protected natural monument, the Lesvos Petrified Forest consists of four major terrestrial and marine fossil sites lying on an area of 15,000 hectares with a buffer zone of 20,000 hectares. The formation of the petrified forest is directly related to the intense volcanic activity in Lesvos during early Miocene times (Zouros, 2010). The geopark, the first in Greece, comprises large accumulations of exposed fossilised tree trunks and four major terrestrial and marine fossil sites in an area of 15,000 ha (Zouros, 2010). Geotourism has been developed across a broad range of activities through a museum, tours and thematic guided walks.

Copper Coast Geopark, Ireland

The geology of Ireland is providing a catalyst for sustainable tourism development in the Copper Coast Geopark, County Waterford. The work began in 1994 as a project jointly managed by the two Geological Surveys on the island, the Geological Survey of Ireland and the Geological Survey of Northern Ireland. The Geopark created a range of educational services and products to raise awareness of its geological heritage and protect its built mining heritage (Maher, 2010).

Fig. 4 Lesvos Petrified Forest geopark (Visit, 2013)

Fig. 5 Copper Coast geopark (Coppercoast, 2013)

Geopark Naturtejo, Portugal

In Portugal, the Geopark Naturtejo promotes its geoproducts through 16 geomonuments or geosites that represent the geological dynamics of the region (Rodrigues and De Carvalho, 2009). This geodiversity can be discovered through walk trails, boat and kayak trips, mountain bike rides, thematic visits (e.g., visits to the Granite Boulders, Roman Gold Mine, Holy Waters, etc.) and educational programmes. Walk trails allow hikers to walk through mountains, valleys, plains, forests, and farms, which, at the same time, introduce them to the surrounding landscapes and underlying geodiversity. Sometimes, these trails focus on important geosites which explain the geological history of a region (Dowling, 2010).

Fig. 6 Geopark Naturtejo (Globalgeopark, 2013)

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BEER TOURISM IN SLOVAKIA

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ABSTRACT
The notion of beer tourism includes several activities such as brewery excursions, beer tasting, beer festivals, beer trails or more complex organized tours with beer themes. Beer production and development of brewing technologies have long-lasting tradition in our country. Even nowadays new breweries are established and old ones are vanishing. The breweries often group in brewery unions. Thus they participate on establishing suitable conditions for carrying out beer tourism in Slovakia. The paper outlines also the various uses of beer and conditions for developing beer tourism.

Keywords: beer tourism, beer, brewery, development, history

INTRODUCTION

Beer is a fluid with rich history. Humans took to it as early as prehistoric times and were gradually improving in its manufacture. They were discovering new ingredients, production processes and uses of this drink.

Nowadays there are about 5 000 breweries which produce nearly 20 000 different types of beer. The biggest consumers are Germans and Czechs.

The essential part of tourism should be the subject, that is the participants of tourism and the motivation of its journey. Potentials of a country and its offer are crucial preconditions for realization of any forms of tourism. These two factors significantly affect the interest of the client in a country and its beer production.

Slovakia has great potential for the development of beer tourism. Beers produced by some of ours breweries are considered as the top on the market and prove their value on various domestic and international competitions.

BEER AND BEER TOURISM

Beer, beverage as popular as tasty, is considered as the oldest man-made drink. In ancient societies had function of beer larger sense, doesn't serve only as a drink of gods and humans, but it was also used like element of different remedies. Its consumption was a symbol of social status, as is evidenced by the fact that it is found in a number of juridical documents of that age [1], [2].

Beer tourism is a type of tourism, of which participants are motivated by gastronomic experience of drinking different kinds of beer and typical atmosphere of brewing restaurants, or knowing history and current technology of beer manufacture. Typical are also visits of breweries which include tasting or participation in beer festivals (Fig.1).

Beer tourism is greatly influenced by the law of National Council of the Slovak Republic from 1 July 1996 about protection from exploitation of alcoholic beverages. This law prohibits selling, serving or otherwise enabling consumption of alcoholic beverages to persons under 18 years of age and persons apparently affected by alcohol. It is very important that the beer tourism has been always operated in accordance with this law; otherwise it could affect the society in bad way.

THE HISTORY OF BEER IN THE WORLD

Theories about the origin of beer are linked to the Palaeolithic or Neolithic period, in which man have begun to store food. Seeds of various plants were ideal for this purpose. They were dehydrated in the sun and fire, or sometimes even parched, and then stored in deep holes in the ground. Thus stored seeds were before use chewed and soaked in a bowl with

water. Human saliva contains a large amount of enzymes and yeasts. One day in the heat was enough to start fermentation processes which create the first cereal fermented drink. Moreover, if the cereals were parched it resulted to something like a first stout [1], [3].

The oldest written records about brewing are more than 5,000 years old and come from region of ancient Sumerians. Sumerians came to Mesopotamia as strangers and researches prove that they learned how to brew beer from natives of this area. It was found that all the words which are related to agriculture, crafts and trade, and were used by Sumerians weren't Sumerian origin. These include words such as "kash" (beer) and "bulug" (malt). However this piece of knowledge doesn't change the fact that this nation significantly improved brewing [3]. Golden drink is mentioned in the epic of Gilgamesh and in Sumerian poem about patron saint of brewing, the goddess Ninkasi. Poems, legends and drawings prove that beer was very important drink to them. Beer was here drunk by slaves, maids of honor or even by kings, but also was used as a sacrifice to the gods; they used it like medium of exchange or medicine. At this time there were already brewed different types of beers in different quality. Some rulers even let the finest imported. So we can face here a first development of beer trade [1], [3].

The first tangible evidence of the brewing come from Saqqara in Egypt. They are from the late 4th and the early 3rd century BC (cf. Fig.1). Probably the oldest evidence of beer in the Hellenic age can we find in Cretan - Mycenaean culture. Greeks have known beer from the earliest times, but they never valued it too much, just like later Romans. Both nations saw in beer consumption effeminacy, which was according to them typical for Egyptians. The only drink of the gods was for them wine. The first beer lovers in Europe were Celts. They were good farmers and they were able to grow all in that age known types of cereals. For example: several sorts of wheat, millet, rye, oats but especially barley, which was for Irish Celts the main cereal for producing staple victuals. The Celts were masters in woodworking and thanks to that they did down in history of beer with important invention - wooden beer barrel.

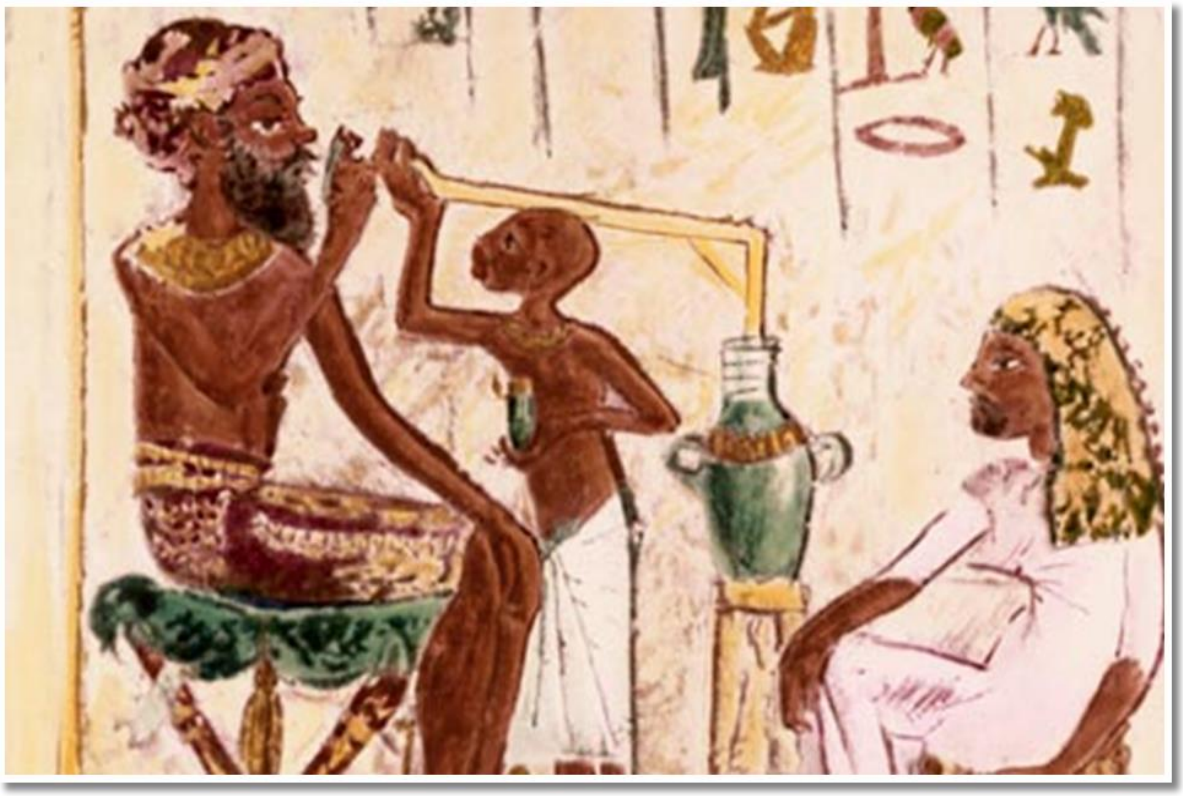

Fig. 1 Beer tasting in ancient Egypt [3]

With approach of our era, beer became very popular especially among the Teutons. According to Nordic mythology beer was made by supreme god Odin, who was in Germany called Wodan. He used his saliva to start fermentation. Because of this they considered drinking beer as a tribute to the gods. For this purpose they used so-called holy beer. His drinking was enforced as duty. Those who refused were deprived of all property and banished from the tribe. It should be noted that in this era, the term beer means dark, turbid beverage which hadn't much common with beer like we know it nowadays [3], [5].

With the usage of hops as a new ingredient it started to be similar to what we know as a beer today. Teutonic tribes can claim credit for this. The oldest supported mention of the use of this ingredient is from 6th century and come from the Gulf of Finland. In 8th century the first hop-fields were established in Germany [3], [6].

Brewing industry has started to fully develop in 13th century when Europe began to produce real beer to the satisfaction of all consumers. Use of hops in brewing significantly improved the quality of the drink, gave him brightness, clearness and bitterness, which makes it perfect to quench your thirst. Brewing has become a privilege. Gradually these privileges were gained by various cities in Europe. In 1293 Dortmund, Hamburg in 1303 and Munich in 1316. These cities competed in the manufacture of the highest quality beer. Munich became the capital of beer. In 1397 the first brewery was opened in Spaten-bräu, which still exists.

THE HISTORY OF BREWING IN SLOVAKIA

In Slovakia there is long and rich brewing tradition. Brewing was already known by the ancient Slavs when they arrived to territory of today's Slovakia. There are written evidence from 5th century that Slavs in Potisie produced beer. Simple and easy preparation allowed to brew beer in each household, which was reflected in its lower quality, probably because of that in period of Great Moravia there were established groups of servants who were specialized in making various kinds of beverages, including beer and malt for the needs of the ruling class [2].

Later, in the early period of the Hungarian kingdom this task was assigned to royal castle's serfs. During this period were established the firsts specialized facilities where high quality beer was produced. Based on royal document of King Ladislaus IV from 1274 we know that there was forerunner of brewery in Tvrdomestice pri Topoľčanoch. Religious institutions helped to expand brewing in Slovakia in large measure, especially the Benedictine monasteries. The evidence from early feudalism proves that beer was brewed by servants of monastery in Hronský Benadik. In the second half of the 13th century, the brewery was situated in newly built cities. The right to brew beer has become one of the basic rights of citizens and was no subject of privileges extended till 16 century [8].

Brewing in cities has became a new chapter in the history of medieval production of beer. The high concentration of people in cities and frequent contamination of water has led to increased of beer consumption. In mining towns of central Slovakia was consumption of beer even bigger than wine consumption. Beer was imported here from areas of southern Slovakia. Latter, beer was brewed in local breweries and so it was cheaper. At the turn of the 14th and 15th century was brewing so widespread that the city council started protective activities that were engaged in importing foreign beer to town. There are cases where was import of beer from the production of other estates even absolutely prohibited. In this way was production of own urban breweries protected. The largest size reached brewing in Slovakia in the years 1620-1650. Brewing centres were mostly mining towns as Kremnica and Banska Štiavnica. Besides these, the production of beer was extremely frequent in Spiš's towns Levoča, Kežmarok but also in the east in Bardejov, Prešov and Košice. In south-western Slovakia that were Trnava, Bratislava and Trenčín [8].

In the 16th century begins brewing in Slovakia to decline. It was due to the development of the brewing industry owned by aristocrats, which gradually led to restriction and elimination of brewing by serfs. Methods of brewing in townhouses, which caused the fluctuation of quality, have become inconvenient. The biggest decline began in 1850. In this year there were established high taxes for brewing, which nearly prevented the home-made production. Trend of declination continued in the second half of the 19th century. Emerging modern breweries with elements of industrial production entirely disabled brewing in smaller enterprises. This transition to the new technologies was for Slovak conditions too expensive, so there were opened only a few large breweries, which had great difficulty to withstand competition from imported beers [1].

Production and consumption of beer in Slovakia decreased significantly. In 1919, was per citizen consumed 14.4 litres of beer per year. In 1931 there has been a small increase in the form of 16.1 litres of beer consumed per citizen per year. However in 1937, this figure dropped again to 13.7 litres. A change occurred after World War II. The quality of Slovak beer has begun to rise significantly. There were new breweries established and in 1978, and at that time, the consumption of beer was 107.1 litres per citizen [8].

PRESENT METHODS OF BREWING

There are used three basic ingredients in brewing. These are malt, hops and water. On them depends the type of beer, its quality and distinctive flavour [9].

Malt is the name for germinated cereal grains that have been dried. It is mainly made of special types of barley as well as wheat. Its impact on the quality of beer is significant. Various qualities of malt, like its colour, taste and smell, determined the type of beer. The quality of the beer depends on quality of malt, and malt characteristics depend on barley which was used or on way of malting process. Malt is produced in malt-house which may be part of the brewery or can be operated individually. Different variants of malt are very important for brewing.

In the Czech Republic usually light pilsner malt is used. In Austria Viennese malts are used, which are intermediate type between light and dark malt. For the production of highly fermented light beers it is essential to use pale malt of Dortmund type, which isn't dried too much. And for the production of dark beers dark malts of Munich type are used. [2].

The second brewery ingredient is hops. Basically they are dried female flowers of hops, which are specially bred for this purpose. Acids, which hops contains, give to beer a typical bitter taste, although it affect aroma , foaminess and acts like a preservative. The quality of hops is based on its colour. Hops should be gently and evenly sulphur-yellow coloured. That means that hops has high content of hop meal. Hops like this smells pleasantly, which is a sign of its freshness. Old hops have an unpleasant smell [10].

Brewing water is the last of basic ingredients. Its quality significantly affects the quality of beer itself. Very important factors are the content of ions, minerals, and water hardness. Water which is used for brewing is called boiling water. Water that is used for cooling, washing and cleaning is called water for industrial purposes. For the production of light beers is the best soft water with low contain of magnesium. We can find those qualities in groundwater from karst areas. Lack of karst water often leads to use of surface water, which must go through several modifications, which are more economically exhausting and complicates production process. In the brewing of dark beer doesn't mind higher hardness.

Brewing consists of several steps. The first is the manufacturing of mash, which consists of rough-grinding of malt, mashing - what is heating of malt groats mixed with water, straining of malt, in which liquid is separated from the solid draff, malt is further mixed with hops and boiled. At the end bitter sludge is separated. The second step is the main fermentation which carry on in closed fermentation tanks. Here is important to keep the prescribed temperature

and time of fermentation. The largest amount of alcohol and carbon dioxide is generated here. The third step consists of final fermentation which runs in lying tanks in low temperature. During this phase, beer becomes clearer, binds carbon dioxide and gain quality foaminess. The next step is filtration of beer in order to gain a longer shelf life. This step is in some small breweries skipped, what reduces the shelf life, but improves taste of beer. The last step is the bottling. Beer is bottled in bottles, barrels or goes directly from tank into the pub. To achieve longer shelf life, the beer can be pasteurized. However, it is same as filtration. Longer shelf life means inferior taste [9].

OVERVIEW OF BREWERIES AND MICROBREWERIES IN SLOVAKIA

In area of Slovak Republic there are currently approximately 21 facilities, which can be called a brewery, microbrewery or brewery cum restaurant,. This number is constantly changing. The number of large breweries decreases but the smaller ones are still increasing. This creates favourable conditions for the development of beer tourism in our area. Small breweries play an important role in the development of regional tourism. They create job opportunities in small towns and villages which aren't interesting for large investors. They also create favourable conditions for so-called, "beer route", which are an attraction for tourists. The advantage of small breweries is that they have an interesting and wide offer of different kinds of beer. They can focus on beer specials, which are for large breweries unprofitable. Another factor which positively affect the prosperity of the Slovak brewing is the existence of different associations which group together breweries. The best known are Slovak Academy of brewing, Association of Small Independent Breweries of Slovakia and Slovak Association of brewing history.

Cooperation with this institutions could be crucial for the development of beer tourism in Slovakia.

OVERVIEW OF BEER FESTIVALS AND CELEBRATIONS IN SLOVAKIA

One of the destinations of beer tourists are festivals and beer celebrations. Trend of organizing such events in our area has in recent years increased significantly. So far there have been a number of beer festivals and celebrations in Slovakia, and several of them have annual periodicity so their tradition continues (Tab.1, Fig.2).

At these events, visitors can taste a wide offer of different beer brands from domestic and foreign producers. They can also try here various specialties of Slovak cuisine. These festivals are often accompanied by music concerts and other event such as various contests and even hiking.

In recent years there is a significant increase of using flavoured beer as a soft drink. Beer is mixed with various ingredients, like a lemonade and others. In Germany a blend of black beer and raspberry lemonade is popular for example.

Beer is sold not only in glass bottles, but also in cans, which were invented in the USA in 1930 and are constantly improved. Packages are also good for advertising. Today the beer is bottled also in a special PET bottles, which don't let the gases out and help to keep the quality of beer.

Conclusions

The paper describes the history of brewing generally and in Slovakia. It also gives the present perception of beer as well as a list of main beer related festivities in Slovakia.

The beer has also therapeutic applications, which at present are inadequately used in Slovakia. The ancient Egyptians and Romans have used poultices of beer foam for cosmetic purposes. In Asian countries there is still held tradition of soothing beer bath, which is growing popular in other countries too. Modern studies have shown positive effects of beer on

Tab.1 Beer festivals and celebrations held in Slovakia

	Name	City	Number of annual events	Year of last held event	Planned events in 2012/4
1.	Pivný festival Prešov	Prešov	2	2012	yes
2.	Záhorácky pivný festival	Prievaly	1	2012	yes
3.	Kaltenecker Starfest	Rožňava	6	2012	yes
4.	Nitrianske pivné slávnosti	Nitra	7	2012	?
5.	Košice pivo fest	Košice	1	2013	?
6.	Zámocké pivné slávnosti	Holíč	6	2012	yes
7.	Kukanova desina	Trenčín	21	2012	yes
8.	Staromestské slávnosti piva Košice	Košice	1	2012	?
9.	Adamfest	Podkylava	2	2012	?
10.	Junifest	Bratislava	5	2008	no
11.	Bratislavský staromestský Beerfest	Bratislava	1	2012	?
12.	Kozlov Pivný Veľkofest	Banská Bystrica Košice, Bratislava	3	2011	no
13.	Gurmán Fest s Bažantom	Bratislava	3	2011	no
14.	KVAS fest	Rimavská Sobota, Poprad, Veľký Krtíš, Hruštín Liptovský Mikuláš	1	2012	?
15.	September fest	Piešťany	2	2012	?

Fig. 2 Beer fest in Košice in 2013

our health. Beer contains hops, folic acid and B vitamins, what results in a regeneration of skin and also has beautifying affects. Beer embalmment is relaxing and washes out unwanted toxic substances from the body. Beer massage has a positive effect against various diseases such as arthritis.

Lastly, it should be mentioned that the alcohol content of beer can lead to intoxication and alcohol addiction as well as to increased body weight as beer triggers the appetite.

Beer trails may help to preserve the brewing traditions in Slovakia and offer an excellent possibility to explore the multitude of tastes – from the bitter pils type to the more rich lager type. In Slovakia one can find nearly all of the 47 basic types of beer [12].They may also help to spread the use of beer in wellness. Fig.3. shows a suggested beer trail.

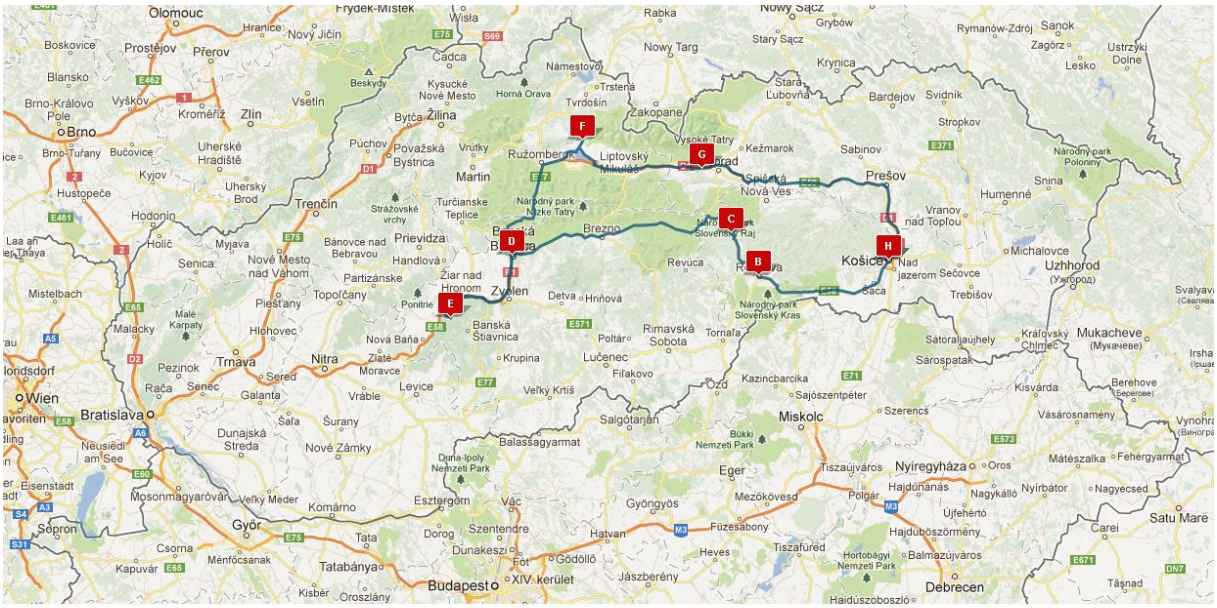

Fig. 3 Suggested beer trail visiting breweries in Košice - Rožňava - Banská Bystrica - Vyhne - Kvačany pri Liptovskom Mikuláši - Svit – Košice [11].

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FOREIGN INFLUENCE IN EVOLUTION OF A NATIONAL MINING SUPERVISION - THE POLISH EXAMPLE

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ABSTRACT
The article deals with the historic evolution of mining supervision on Polish territories through the ages. The scrutiny is based on the accessible processed historic sources. The main characteristics of the proprietary mining supervision were analysed along with the transition to the mining offices system, the basic principles of the directorial rule and a specific of Polish People's Republic period. The author was trying to explain why the mining supervision in Poland evolved in the way it did. A possibility of emerging of a new pattern of mining supervision functioning has been pointed out.

Keywords :mining history, mining supervision, mining office, directorial principle, inspective system

INTRODUCTION

The purpose of the article is to investigate abroad patterns which shaped Polish mining supervision. This topic is yet not well researched and only some minor contributions were made to enlighten the problem, and even these are confined to Polish State Mining Authority (SMA) circulations and not known to the general public. The topic formulation demands an explanation what I mean by 'mining supervision'.

There are many definitions of supervision. For the article needs it is quite satisfactory to point out that notion of supervision always describes the supervisor – supervised relation. The supervisor may – and should – influence the supervised. He is obliged not only to search for any irregularities but his duty is to show the supervised what kind of behaviour is right and to be copied. It is important to perceive mining supervision as a vital role-player in mining, not reduced to a passive controller.

PROPRIETARY SUPERVISION – THE EUROPEAN PATTERN INTRODUCED

As in many other European countries the full-scale mining of ancient Poland was reserved for the sovereign. He was the prior land owner and because of that he enjoyed the sole privilege of minerals extracting. So called monopoles of the prince, known also as *regalia* touched many dimensions of public life, from the right to raise taxes to the exclusive freedom of beavers hunting. Anything precious or rare sooner or later became the prince monopoly. Without hesitation we can say that most important of all was the right to exploit minerals – treasurers of the Earth. The sovereign executed these rights freely and was entitled to grant them to his subjects and foreigners at will – either in full respect or in a part.

Usually such a grant was done with certain restrictions and fiscal burdens. It was expected from a prince to confirm all privileges concessioned by his ancestors but it is equally true that a prince modified the document by adding his own amendments and additional conditions. Through ages the privileges for barons and bishops were ever and ever more generous, yet a prince never renounced all his rights to the mineral exploitation – some burdens and services were still to be rendered to the mineral deposit owner.

Understanding this we are not mistaken stating that in Middle Ages and in early modern ages mining supervision and proprietary supervision were basically the same. Most important things for a sovereign were seam propriety rights, proper profits distribution and, most important of all, fulfilling all the fiscal obligations by a licensee. It means that the core competencies of contemporary mining supervision – work safety and proper technology of exploitation – were out of the supervision scope and were left in hands of miners.

In these ancient times the deposit owner, acting as mining supervision authority, was a mediator and judge between the deposit licensee and workers. We have rumours of a miners' uprising in Silesia as early as in 1220. The miners fought against the Wroclaw bishop who executed tithes from his lease mines. That is a clear evidence that at that times the miners were already a coherent and strong community, conscious of their common interests and the need for solidarity.

There is no doubt that work safety and life protection of miners were important, especially for the miners themselves, but unfortunately we have no proof of that in the documents. The reasons of the fact are very simple. The art of writing was a rare competence and writing materials were inconceivably expensive. It took months or even years of hard work of a copyist to produce a single book. The price of a book was comparable to buying a hamlet. In this state of things only most important information was written down. So when we can find any notice of mining these are remarks and facts vital for licensees and mineral deposit owners: what are burdens and obligations attached to a particular mining license, when and under what conditions that licence expires, what are the exact boundaries of licensed deposit etc. Technical aspect of mining (safety regulations included) were not mentioned as not pertaining to the terms of agreement between a sovereign and a licensee. The professional miners were supposed to know all the technical intricacies by practise and these need not to be recorded.

We know a few mining regulations for different mining areas at that time but there was lack of permanent mining supervision institution countrywide. The only and ephemeral exemption was a royal mining bailiff (*podkomorzy*) who entered history in 1517. He was responsible for mining licence policy in the kingdom and took action against any spotted illegal mineral exploitation. But after that date we hear about this post no longer. It seems the resistance of the barons proved too strong for that measure of royal mining control and it did not put down roots in the old Poland institutional system.

MINING OFFICES SYSTEM – SILESIAN INVENTION DUE TO GERMAN-POLISH CROSS-BORDER

New shape of mining supervision system was created outside Polish Kingdom - in Silesia. At the end of 15th century special mining offices were established by the dukes and princes of Silesia in their vast latifundiums. The task of a mining office was to sell licences for searching and extracting minerals, establish mines and determine the borders of a mining license. Other duties of mining offices included technical and economic supervision of mines, administration of justice in mining cases and operating of miners self-management.

As we can see the mining offices still presented the point of view of a proprietor. In his name they supervised technical works, use of materials, means of exploitation or transportation in mines. It was their responsibility to set differences between miners and mine managers. In fact, the head of a mining office was the superior of all the mines personnel, along with his office staff.

The sharp institutional distinction between supervisor and supervised entities, so natural for the contemporaries, was still not existing. The mining supervision of those times could be described as a “mining police”, being a representative of the owner in relations with mines managers.

What was new was a permanent office for mining supervision. Not a post, not a privilege, but an institution called into being on established rules and included into the whole system of the sovereign administration. In a short time it appeared the mining offices system tends to issue detailed mining activities regulations, not known before. Of course the statutory laws of Wieliczka or Bochnia salt-mines were extensive and specific, but they pay not so much attention to miners’ work conditions as the mining offices regulations did. Most notorious of them was “*Ordunek gorny*” (Mining order) of 1528 for the mines of silver and lead near

Bytom and Tarnowskie Gory cities. It consisted of 72 articles regulating to the slightest detail mining contemporary techniques and methods, based on foreign mining statute books and native mining custom law as well. The interests of the owner and miners' community are well balanced and great pains were taken to safeguard miners' life and proper operation of mines. As the water was the predominant danger the countermeasures to prevent this power of nature were described, lines of the surveillance determined and punishments for those who would not comply with the regulations were signalled.

Moreover, Silesian mining offices had more significance for mining supervision development because, contrary to Polish Commonwealth practices, their jurisdiction comprised not only the princes' mines but, to some degree, private mines were subordinated to the authority of mining offices clerks, especially when work safety issues were at stake. True, mining offices were still preoccupied with the *regalia* concerns: they granted mining licences, measured mining areas boundaries, judged all the controversies in mining society and managed all financial and social affairs of miners' associations. But, apart that, they were responsible for mining work conditions monitoring and preventing mining catastrophes. In time some sort of routine for mining office inspectors was settled. We came to the knowledge that during a week one day was for a paper work, one for accounting scrutiny and as much as four for mines inspection *in situ*. The next observable similarity in comparison to the contemporary Poland was the separation of mining supervision from extractive industry. To prevent any bias and corruption among the supervision inspectors they were forbidden to take any part in mineral exploitation, either as licensees or as workers. In many a respect that system was very similar to today's standards in mining supervision.

Successive stage of mining supervision evolution took place in the 16th Austria. Rudolf II, Austrian emperor implemented in his dominion the mining offices system. It was centralised for the whole Austrian Silesia and Klodzko county with a special official for supervising all exploitation matters (a *nadgomistrz*). The duties of the *nadgormistrz* were pretty much the same we listed above describing *modus operandi* of Silesian princes system, who were, by the way, vassals of Austrian Emperor, so the imitation was a natural one. But a new element was added: when mining works were finished the licensee was obliged to restore the original landscape and compensate for any damages caused by mining activities. This way we came across another dimension of mining supervision: the environment protection and land rehabilitation.

Underlining the innovatory aspects of mining offices system we should not forget it was not the mining supervision we know nowadays. The system was not completed, the nomenclature and competencies of mining officials were in constant change and the mining offices system was frequently mixed with the fiscal and municipal administration. We could say that there was still no mining supervision but a treasury supervision in mining area. The front-line task of that supervision was to take care of financial incomes of a ruler and work safety issues were taken into account as far as they can diminish those incomes.

DIRECTORIAL SYSTEM – PRUSSIAN DRILL

Evolution is not a one-direction move from less perfect forms to the better ones. Evolution meanders and it often put things in regress in some respects while there is a handsome progress in other dimensions. Such a situation we can observe in the evolution of mining supervision too.

In the 18th century the Silesia region went under Prussian rule. Prussic Kaiser Frederic II perceived himself as a great reformer and an ardour progress partisan. Changes touched the extractive industry as well. The mining offices system was topped up with the Upper Mining Office, acting as a higher level in administrative procedure and as a controller toward other mining offices.

Fig. 1 Prussian mining inspectors at work, 19th century

In this structure the wide range of the mining offices competencies, among which we can find as well supervisory as managerial powers, were transformed in the 18th Prussia in so called directorial rule. According to the rule the mines management was in hands of mining offices directors. The actual mines owners were reduced to a kind of a stakeholder. They were only entitled to take the mine profits or were forced to pay the balance if costs topped gainings. In this way mining supervision officers provided for technical, economic, fiscal and any other aspect of mine functioning. They collected petitions for new mining licences, granted those licences, enrolled new mineral seams, set boundaries of mining fields. Only them were entitled to hire miners on all posts, defined payment schemes in mines, decreed a volume of exploitation and settled prices for particular minerals. Their burden was to keep up-to-date registries and mortgages, administer the mining law, scrutinize mining schools activities, collect various mining taxes and decide on dividends and excess fares.

But not only the form of mining supervision of that time was far from our standards and conceptions. Also the mine ownership was a form of a cooperative association. Every member of such a cooperative had his share. The problem is that a classical cooperative is based on freedom principle, whereas those mining cooperatives were compulsory and introduced in all the mines.

Fig. 2 The stamp of Prussian Upper Mining Office in Wroclaw.

In many respects the transformation proved initially to be a stunning success. Everything was under control, new work methods and technologies were hastily enforced, mining entrepreneurs were constrained and social clash reduced. The mines responded swiftly and obediently to any government recommendations and suggestions as they were run (directly or indirectly) by the governmental officials. The government was able to set the mining policy at its fancy and was given with full reports on every aspect of mining. Any owners and licensees resistance towards new technologies and innovative work organisation was easily crushed.
But the success was equally short-lived as was the real socialism economic growth a few centuries later. The mining inspectors were not ideal managers. Moreover they managed the property of others and were not restricted by a sound economic calculation. If there was no profit they did not suffer directly. No doubt they knew something about mining works and paid attention to the miners' health protection but it is not enough to run a big extractive factory.

From our point of view the greatest failure of the directorial rule was the tangle of supervision and management. Not by a chance in later phases of classical mining offices system the supervision was consciously detached from the whole business of extracting minerals. Any control unit must be independent from the bodies which are controlled. The interests confusion should be avoided. If mining inspectors have any ties and connections with mining industry they cannot be trusted to apply objective perspective while performing their duties and all kinds of irregularities are bound to arise. It is clear that such a sharp separation is extremely hard to achieve because the mining inspector should have solid mining background and experience and even today this rule is observed with immensurable difficulties.

Nonetheless that distinction is *sine qua non* for properly operating mining supervision. The Prussian statesmen disregarded that principle. The mining offices operated the mines and at the same time overlooked how mines are operated. In effect the mining supervision was driven back to a sort of internal or self-control. The whole history of public administration proved sufficiently that such a control is definitely ineffective if not detrimental. The simplest explanation is that the mining officials were torn between the contrary directions: they strived hardly to make an economic profit and simultaneously they were expected to put some safeguards on this profit pursuit.

In fact, the directorial system proved to be bound for crisis because of the confusion of supervisory and managerial prerogatives and generated its own ruination in less than fifty years. A special commission by Prussian government exposed technical backwardness of many mines, lack of professionals, outdated production methods, a large-scale corruption and – as to be expected – acute financial shortages in mines budgets. The worst was the fact that mining inspections came to be a pretext or even a farce. When inspectors arrived the mine staff was off duty and the inspectors had no time for any inquiries as they feasted with the mine management. On the other hand it should be remembered that directorial rule implemented many useful work safety procedures which today are seen as indispensable standards for ensuring safety in mining.

POLISHING MODERN FORM OF MINING SUPERVISION – THE GERMAN-ORIGIN INSPECTIVE SYSTEM

The directorial rule dragged for some period by a sheer obstinacy and was finally abandoned in 1851. The mines owners, feeling free from the cooperative chains, took back control of their own mines management, either in technical or in organisational aspects. In the new state of things the mining offices were deprived of mines direct management, concentrating on supervising how this task was conducted by the mines management boards;

instead of implementing work safety rules the mining offices inspected how those rules were put into practise.

What was not changed was the mines supervision dominant method, namely – inspections. Moreover, ever since mining offices were unburden with everyday mines management they could (and they did) concentrate on the actual supervision. By opposition to the previous system the new mining office working regime is then described as an inspective system. The newly introduced (but not altogether new) system concentrated all the vital competencies of mining offices supervision in the work safety domain: proper procedure of mining works (a mining works plan was to be approved), health and lives of miners protection, mining lands conservation, mining damages prevention and mining machinery supervision.

One of natural consequences of the inspective system was a new territorial organisation well-fitted to inspection duties. Mining areas was divided in 7 equal mining circles – each one was the territorial properness of a district mining office. A new mining law was issued in 1875 for the whole country and out-dated directives and ordinances were nullified. A certain feature of the directorial rule was yet still discernible – the mine managers were included in the mining supervision administration as its lowest grade.

The inspective system was more concentrated on the safety in mines. The mining plant operations were introduced and their implementation was carefully scrutinised. The mining inspectors checked how miners' health was protected, supervised machinery, overlooked means of mining areas protection and mining damages prevention. They took care of mining schooling and professional trainings of miners. The mining supervision officials were empowered to halt all the mine operations and to introduce *ad hoc* new ordinances. For the very first time the scientific approach to underground outbursts was undertaken and written work regulations added to an employer's obligations. In fact that range of a government control was incomparable with any other public sector. It was due to the significance of extractive industry in Prussian state and to high level of professional risk in this industry branch. The state control exceeded the mining plant boundaries: if a miner was caught drinking in a tavern at a pay-day he was prosecuted. If that offence was committed trice such a recidivist was just fired.

From the conventional point of view the mining supervision should be perceived as an ally of workforce striving to protect them against aggravations of dishonest employers. But the reality was more complicated. For instance when in 1870 the underground persons' localisation was enforced (miners had to wear special marks to make sure no one was left forgotten underground after the shift was over) the general strike was the answer. The miners suspected the only purpose of that invention was to coerce them to harder, longer and more efficient work.

ORIGIN OF MODERN MINING SUPERVISION IN REBORN POLAND – A MELTING POT OF PRUSSIA, RUSSIA AND AUSTRIA

Mining supervision in Second Polish republic (1918-1939) was founded on the legacy of Germany and two-level mining offices structure was its main characteristic. Of course some traditions and solutions were taken from all three countries which up to then controlled Polish territories, e.g. Russian concept of a special mining corps was the model for the organisation of the mining supervision structure and for building a professional tradition and a *l'esprit de corps* in Polish mining supervision administration. Austrian heritage helped to straighten up the problems of oil extraction. But we cannot say the mining supervision of the reborn Poland was a mixture of these three countries mining patterns. Most of Polish mining territories were located in the previous German dominion and Prussian mining organisation was deemed as most advanced in technical and organisational respects.

Fig. 3 The first page of the commemorative book of Polish mining supervision, 1927.

Upper Mining Authority (the upper level of the supervision system) granted licences for categories of minerals monopolised by the state and was responsible for tax collection in that respect. But its foremost task was to take care of work safety in mining plants or wherever mining works were conducted. In his first public statement the newly-created head of UMA in Katowice Zygmunt Malawski declared to fight fiercely for the just workers' rights. In order to do that UMA issued its own rules of mining law, supervised the process of miner's education and dealt with mining damages prevention process.

Fig.4 The headquarters of Upper Mining Authority in Katowice in the inter-war period

The grass-root work of making Polish mines safe was performed by territorial mining offices (the lower level). They conducted inspections and accident investigations on a regular basis. Their responsibility was to make sure that mines working conditions and machinery operating were strict to the lawful regulations. The number of inspections was in no way limited or categorised; thanks to that the mining offices were able to adapt its activities to the real situation in a local mining environment. The new form of activity of mining supervision were work safety conferences.

On the whole the system was based on German lines. To tell the truth the inspective system took its main characteristics on the eve of the 20th century and today these stay as the fundaments for mining supervision across Europe. Technical revolution speeds up its pace, new work methods are introduced but the corner-stones of the system remain stable. The makers of Polish system should be praised that they refrained from any kind of a mindless revolution and took for granted the best accessible solutions.

What these makers did was an enormous work of transforming the inspective system to the new realities. They had to revise and, in many instances, rewrite various pieces of mining regulations left from three different states to create a viable mining law for a new country. They took pains to design a pattern for the mining schooling and the mining professional training. They called into being a system of mining rescue and took into their work outline not only the “hard control” methods but also the “soft” power of safety promotion and best practices propaganda. In just twenty years the scope of the work they did is simply incredible, especially regarding how outnumbered they were in comparison to their tasks. The crowning achievement of that time was the issue of a new, modern, comprehensive Mining Act of 1930. In summary we can assess their work as the tremendous “basic work” to set Polish mining supervision into the rails of European standards and they succeeded. One thing still hampered the work efficiency of the mining offices: although their structure consisted of two levels and the hierarchy was clearly defined, for the whole inter-war period two or three Upper Mining Authorities existed. It meant no managing centre for mining supervision emerged (ministerial bodies were too distant and too preoccupied with different tasks to take over that role) and the specific UMAs pursued different work standards and inspection methods. Frequent administrative changes of territorial properness of mining offices made things no better.

PRESENT-DAY OF POLISH MINING SUPERVISION: IS SOMETHING FROM ABROAD LOOMING AHEAD?

We can rightly ask if any real change of the mining supervision paradigm has occurred since 1939? We spotted in this article three such paradigms: the proprietary model, the directorial rule and the inspective system. Could it be that the last one is the end of mining supervision history on the pattern that Francis Fukuyama described in 1989 in politics?

No one can be sure of the answer but there are hints there is another paradigm on the horizon. Some countries, mostly anglo-saxon ones (Australia, USA, New Zealand), try to pose mining supervision in the position of a typical regulatory body which sets rules of the game but intervenes rarely (only if the game rules are broken). In this pattern the burden of safety prevention and environment protection is carried out by an entrepreneur (licensee) who is responsible for making all necessary arrangements and best practices. The inspections are very limited and executed mostly *post factum* when the precautions taken by the entrepreneur have failed. The mining supervised focus is shifted from inspections to mining education and desirable behaviours promotion. As far the outcomes of this approach are very encouraging and some features of this new attitude we can see in Polish mining supervision.

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Photos no 1-3 due to the courtesy of Coal Mining Museum in Zabrze *(Muzeum Górnictwa Węglowego w Zabrzu)*.

VALORIZATION OF POST-MINING DUMPING GROUNDS IN UPPER SILESIAN COAL BASIN (POLAND) AND RUHR DISTRICT (GERMANY)

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ABSTRACT
The purpose of the paper is proposal of a method of valorization of post-mining dumping grounds in Ruhr District and in Upper Silesian Coal Basin. There were chosen two valorization criteria: substantial value and accessibility. There were analyzed 20 representative objects from each region. The evaluation of the dumping grounds situated in Ruhr District resulted in high grade assessment, what is linked with the high level of technical and biological reclamation. Post-mining dumping grounds in Upper Silesian Coal Basin are evaluated with low grade, what is connected with poor level of reclamation and managing of these areas.

Keywords: post-mining dumping grounds, valorization, reclamation

INTRODUCTION

Each mining region has specific landscape features. One of them are post mining dumping grounds. The Ruhr Basin and Upper Silesian Coal Basin have similar history and geological conditions and in both regions there are more than 300 coal mining waste dumps. These object differ in biological reclamation level and ways of management. The German objects represent examples of efficient reclamation, which is connected with particular legal regulations. In Poland the level of reclamation and management of dumping grounds is not satisfactory. In the literature there have been elaborated criteria of valorization of post-mining dumping grounds both in Poland and in Germany. In the paper there is presented an attempt of comparison of results of valorization of Polish and German objects in order to use experiences of reclamation and using of post-mining dumping grounds in examined regions.

POST MINING DUMPING GROUNDS IN UPPER SILESIAN COAL BASIN AND IN RUHR DISTRICT

Due to the latest inventarization in the Upper Silesian Coal Basin there are ca. 220 coal-mining waste dumps. They concentrate mainly in the central and south-western part of USCB. The largest "Central waste dump" in Knurów reaches the surface of 255 x 10^4 m^2. Altogether the dumping grounds cover more than 4000 x 10^4 m^2 and gather more than 700 million Mg of mining wastes. According to various sources, it is estimated that for each 1 Mg of coal produced, there is 0,4 – 0,5 Mg of waste material. This material has to be deposited in the coal mining dumps. The production of hard coal in Poland in 2012 counted 79,2 million Mg (www.stat.gov.pl). This allows to estimate that approximately 31,68 – 39,6 million Mg of waste material was produced in the year as well. In the past, due to the poor coal preparation technology the majority of this waste material was stored in coal mining waste dumps. The coal-mining waste dumps in USCB belong mainly to the first category of dumps, called conical dumps and second category of dumps – table mountain dumps. The dumping grounds of the first and second category cause serious threats to the natural environment. This threats are predominantly connected with fire hazards, because of the oxygen inflow to the not enough compacted waste material. There are only few objects which belong to the third category – landscape dumps [3]. There is also an opportunity of using such objects as park and recreation areas and geotourist objects, but their development is nowadays in an early stage.

In Ruhr District there are only 4 active waste dumps connected with the activity of 2 working coal mines. There are ca. 170 coal mining dumping grounds in Ruhr area [7, 8]. The largest waste dumps in the Ruhr Basin reach the surface of 160 x 10^4 m^2 (waste dump Hoheward in Herten). The coal-mining waste dumps in the Ruhr Basin belong mainly to the

third category of dumps, called – landscape dumps [2, 5]. These dumps represent recreation and sport areas, with well developed paths or cycling trails, they may also be examples of properly done biological reclamation. Many objects can be considered as geotourist attractions [4].

There are many significant environmental impacts connected with post-mining dumping grounds. The most dangerous environmental impacts of coal mining waste dumps are fire hazards. The lack of compacting of waste material, as well as ignoring rules regarding fire prevention are nowadays a cause of numerous spontaneous combustion events particularly in old coal-mining waste dumps (mostly conical dumps). Coal substance and pyrite present in waste material undergo intensive oxidization, which leads to self-ignition inside the dump. The fire resulting from waste materials deposited in dumps may be the result of two kinds of processes: exogenic processes, where the source of heat is external and endogen processes, The fire hazards on coal-mining waste dumps are strictly related to the ways of reclamation, e.g. afforestration. The trees make waste material more loose and enable access of oxygen to the dump. It results with the higher grade of hazard of self-ignition [2, 4].

PRINCIPLES OF VALORIZATION

Valorization of the coal mining waste dumps was carried on using combination of two conceptions applied in Ruhr District and USCB [3, 4]. This conception is based on two criteria: substantial value and accessibility. There were chosen 20 representative objects from each region according to their surface, situation, way of using, and complexity of environmental problems.

The principles of valorization encompass following features:

No 1 - Biologic reclamation(R_B)

No 2 – Reclamation with regard to revalorization of the landscape (R_K)
No 3 – Attendance (F)
No 4 – Representative significance (R_Z)
No 5 – Regional significance (R_G)
No 6 – Ways of using (Z)

The substantial value of analyzed objects is measured according to the formula [6]:

$$W_M = \log_2 (R_B * R_K * Z * U)$$

where:

R_B – Biologic reclamation
R_K – Reclamation with regard to revalorization of the landscape
U – Supplement criteria ($R_G * R_Z * F$).
F – Attendance
R_Z – Representative significance

Such counted substantial value is evaluated using following scale:

$0 < W_M \leq 3$ – low substantial value;
$3 < W_M \leq 6$ – middle substantial value;
$6 < W_M \leq 9$ – high substantial value.

The evaluation of particular criteria will be signed by the ranks given to the objects with the values 4 (high), 2 (middle) or 1 (low).

Both biologic reclamation and reclamation with regard to revalorization of the landscape is evaluated in a similar way and is described lie following:

Biological reclamation (R_B):
4 – high rank – natural and park and recreation way of using
2 – middle rank – afforestration in a park way
1 – low rank – lack of reclamation activities, natural succession.
Reclamation with regard to revalorization of the landscape (R_K):
4 – high rank – „architecture-landscape direction”,
2 – middle rank – „technical-natural direction”,
1 – low rank – „technical direction”.

Supplement criteria – these criteria are composed of three factors: regional significance (R_G), representative significance (R_Z) and attendance (F). There is a rank of value 2 when the criterion is referring to the investigated object or 1 if the criterion does not occur. The criterion attendance (F), is considered as supplement after change of relevance of feature occurrence in examined objects. The localization in the neighborhood (to 1 km) of similar objects (more than one) from the same technical field qualifies the object for receiving of rank with value 2. The rank of value 1 will receive object situated near the coal mine.

The accessibility of the objects is measured as [6]:

$$D = \log_2 (P_K * P_T * S)$$

where:
P_K – situation of the object according to communication routes
P_T – situation of the object according to tourist routes
S – grade of terrain difficulties.
The accessibility is evaluated according to the scale:

$0 \leq D \leq 2$ – poor accessibility; $3 \leq D \leq 4$ – middle accessibility; $5 \leq D \leq 6$ – good accessibility.

The ranks of criteria determining accessibility looks as follows:

Situation of the object according to the different communication routes:
4 – high rank – object situated near motorway,
2 – middle rank – object situated near main road,
1 – low rank – object situated near local road.

Situation according to the touristic routes:
4 – high rank – object situated on the thematic route from particular field e.g. route of technical monuments or tourist,
2 – middle rank – object situated on the cycling route,
1 – low rank – object situated outside aforementioned routes.

Grade of terrain difficulties:
4 – high rank – object good exposed in the terrain, lack of environmental hazards, well developed net of roads and paths.

2 – middle rank – object poor exposed in the terrain, lack of environmental hazards, poor developed net of roads and paths.
1 – low rank – object situated in private area, fenced, visiting requires permit or the object has high environmental hazard. [4].

RESULTS OF VALORIZATION

There was analyzed statistically occurrence of six features in investigated objects in USCB (table 1). The results of the valorization are presented in the table 2

Tab. 1 The combination of occurrence frequency (%) of particular features in selected objects.

Feature	**Occurrence of the feature in investigated objects „+" (%)**	**Lack of the feature„–" (%)**
No 1 – Biologic reclamation	70	30
No 2 – Reclamation with regard to revalorization of the landscape	75	25
No 3 – Attendance	80	20
No 4 – Regional significance	20	80
No 5 – Representative significance	35	65
No 6 – Ways of using	30	70

Source: self study

Tab. 2 The results of evaluation of coal mining waste dumps in USCB

Object	**Substantial value**							**Accessibility**			
	R_B	R_K	F	R_G	R_Z	Z	Result	P_K	P_T	S	Result
No 1	2	2	1	1	2	2	middle	1	4	4	middle
No 2	1	1	2	1	1	1	low	1	4	2	middle
No 3	4	2	2	1	2	1	middle	2	4	2	middle
No 4	4	2	2	1	1	1	middle	2	2	2	middle
No 5	1	1	1	1	1	1	low	1	4	2	middle
No 6	4	2	2	1	1	1	middle	2	4	2	middle
No 7	1	1	4	1	1	1	low	4	2	2	middle
No 8	2	2	4	1	1	1	middle	4	2	4	good
No 9	1	1	2	1	1	1	low	4	2	2	middle
No 10	1	2	1	1	1	1	low	4	2	2	middle
No 11	1	1	2	1	1	2	low	1	4	2	middle
No 12	2	1	4	2	2	1	middle	2	2	2	middle
No 13	4	4	4	2	1	2	high	4	2	4	good
No 14	4	2	4	1	2	2	high	2	2	1	poor
No 15	4	4	4	1	2	1	high	2	2	1	poor
No 16	2	2	2	1	1	1	low	2	1	2	poor
No 17	4	2	2	1	1	1	middle	2	4	2	middle
No 18	4	2	1	1	2	1	middle	4	4	4	good
No 19	4	4	4	2	1	2	high	4	4	4	good
No 20	4	4	2	2	2	2	high	4	1	4	middle

Source: self study

The comparison of frequency of occurring of particular features indicates first differences between waste dumps situated in the Upper Silesian Coal Basin and waste dumps in Ruhr

Basin. Because of this fact, there was proposed a change in relevance of these features. The features where the frequency of the occurrence overran 60 % were considered as main features and to that group belong features No 1, 2 and 6. The other features are treated as supplement features.

Another step was an accessibility analysis what resulted in modification of second evaluation criterion.

Similarly, considering waste dumps in USCB the evaluation of substantial value and accessibility is measured according to the fixed formula. The value of particular features is estimated on accordance with given ranks in three-grade scale. These ranks receive following values: 4 – high rank, 2 – middle rank or 1 – low rank, and in the case of supplement criteria receive rank of 2 or 1 [3].

There was also analyzed statistically occurrence of six features in investigated objects (table 3). The results of the valorization are presented in the table 4.

Tab. 3 Configuration of frequency (in percent) of occurrence of particular features in investigated objects.

Feature	**Occurrence of the feature in investigated objects „+" (%)**	**Lack of the feature„–" (%)**
No 1 – Biologic reclamation	90	10
No 2 – Reclamation with regard to revalorization of the landscape	95	5
No 3 – Attendance	60	40
No 4 – Regional significance	55	45
No 5 – Representative significance	35	65
No 6 – Ways of using	70	30

Source: self study

Tab. 4 Results of valorization of coal mining waste dumps in the Ruhr Basin

Object	**Substantial value**							**Accessibility**			
	R_B	R_K	F	R_G	R_Z	Z	result	P_K	P_T	S	result
No 1	4	4	2	2	2	2	high	4	4	4	good
No 2	4	4	2	2	2	2	high	4	4	4	good
No 3	1	2	1	1	1	2	low	4	2	2	middle
No 4	4	4	2	1	2	2	high	4	4	4	good
No 5	4	4	4	1	2	1	high	2	4	4	good
No 6	4	4	4	2	2	2	high	4	4	4	good
No 7	4	4	4	1	2	2	high	4	4	4	good
No 8	2	4	1	1	1	2	middle	1	1	1	poor
No 9	4	4	1	1	1	2	middle	1	1	2	poor
No 10	1	2	1	1	2	1	low	2	1	2	poor
No 11	4	4	2	2	2	1	high	1	4	2	middle
No 12	4	4	2	2	2	1	high	4	4	4	good
No 13	2	1	1	1	1	1	low	2	1	2	poor
No 14	4	4	2	1	1	1	middle	2	4	4	good
No 15	4	4	2	1	1	1	middle	2	4	4	good
No 16	4	4	2	1	2	1	middle	2	4	4	good
No 17	4	4	4	1	2	1	high	2	4	4	good
No 18	2	4	2	2	1	1	middle	4	4	4	good
No 19	4	4	1	1	1	2	middle	2	4	2	middle
No 20	4	4	2	2	2	1	high	2	4	4	good

Source: self study

Analyzed objects are examples of numerous possibilities of using of post mining dumping grounds, what made this feature the leading criterion. Because this feature is a component of substantial value the most important fact seems to be using of coal mining waste dumps in a didactic direction (high rank with value 4). Such way of using outlines genesis of the object and its primary destination. The middle rank (value 2) receive waste dumps used in a sport-recreation and artistic direction because here the object is used itself. Coal mining waste dumps which are not used receive a rank of value 1. [4].

CONCLUSIONS

The results of valorization of coal mining waste dumps in USCB are as follows: 5 objects received high evaluation of substantial value, 8 objects were classified as objects of middle value and 7 objects were evaluated as low substantial value. The analysis of the results allows to determine that high value was attached to the objects where the reclamation works were done properly. As far as the accessibility is concerned 4 objects received the highest grade, three objects – low and the others middle.

The valorization of coal mining waste dumps in Ruhr Basin showed following results: 10 analyzed objects received high substantial value, 7 middle value and only 3 objects received the lowest grade. Particularly large number of objects qualified for the highest grade is connected with advanced level of reclamation of the waste dumps in Ruhr Basin. As far as the accessibility is concerned the lowest rank received 4 waste dumps, middle rank – 3 and other objects good rank what is linked with numerous ways and forms of using of investigated objects.

Obtained results allow to evaluate the post mining dumping grounds situated in Ruhr District with high grade, what is connected with the high level of reclamation. Coal-mining waste dumps in Upper Silesian Coal Basin are evaluated with low grade which is linked with poor level of reclamation and managing of these areas.

There is a need of using of positive German experiences in Poland, because the process of reclamation of dumping grounds lasted ca. 20-30 years longer than in Poland.

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GYULA SZENTISTVÁNYI THE WELL-KNOWN PROFESSOR OF MINE SURVEYING IN SELMECBÁNYA AND SOPRON

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ABSTRACT
At the Academy of Mining and Forestry in Selmecbánya Gyula SZENTISTVÁNYI was requested to head the Department of Mine Surveying and Geodesy after the retirement of Ottó CSÉTI in 1902. His quarter-century training activity (more exactly 24 years) as a professor covered in larger part at the Academy of Selmec and in smaller part at the College of Sopron. In my study I am going to outline his activity as the excellent mining engineer/mine surveyor, the well-known professor, specialist, inventor and instrument-constructor.

Keywords: Gyula SZENTISTVÁNYI, Academy of Selmec, mine surveying, historical surveying instruments

GYULA SZENTISTVÁNYI'S LIFE, PUBLICATION ACTIVITY, AND HIS INSTRUMENTS

Gyula SZENTISTVÁNYI (József Gyula SZENT-ISTVÁNYI, Gyula SZENT-ISTVÁNY) was born in Gölnicbánya of Szepes County. He came from an old miners' family; his father was a mining inspector. He finished his secondary schools in Kassa in 1873. Then he worked as an apprentice at the István Furnace. In 1874 he came to the Academy of Mining and Forestry in Selmec as a scholarship holder where he graduated in 1877. He passed the mining state exam after two years, in 1879, and became a mining engineer.

He entered into governmental service as a *Hungarian royal mining apprentice* with a day's wage of 1 Forint and 50 krajcár at the Mining Management of Nagybánya even in his graduation year, in the last quarter of 1877. Later he worked in *Szélakna*, *Istenáldástáró*, *Finsterort*, and *Brennertáró*. The *nearly two-decade service in Hodrusbánya* provided him *significant practical knowledge* from 1880. There, first he was a *production engineer* with a salary of 1000-1200 Forint at the private mines of Finsterort; then he worked as an *engineer in governmental service* with a salary of 1450 Forint because the mines of Finsterort were in governmental hand again. Between 1897 and 1892 he was the *chief engineer* of the royal mines of Hodrus and Selmec. In *1897* he drew the *map of Selmecbánya and its surroundings* for which he received *significant royal honours* [1], [2], [7], [8].

Before continuing the introduction of his rich oeuvre now, at the beginning of our study let's remember his personality, the well-known former professor of mine surveying with the photographs as follows (see the pictures of Figure 1 bellow).

From the autumn of *1902* he taught students at the *Department of Mine Surveying and Geodesy*, and *after CSÉTI's retirement he was appointed to the vacant position in 1904*. Here he worked for *17 years*.

You can read in the Miscellanies column of the Journal of Forestry, 1904 (Personal news) as follows [4]:

"The king appoints Gyula SZENTISTVÁNYI chief mining engineer to mining counsellor and professor of land and mine surveying at the Academy of Mining and Forestry."

The Miscellanies column of this journal (Volume 44, Issue 11) deals with the *question of removal* of the Academy *from Selmecbánya to Budapest* as well. In connection with this here we can find the following [5]:

"The town refers to that the older professors such as *Lajos FEKETE, Róbert SCHELLE, Gyula SZENTISTVÁNYI, Károly FALLER; and mainly Jenő SOBÓ took up his position against the removal."*

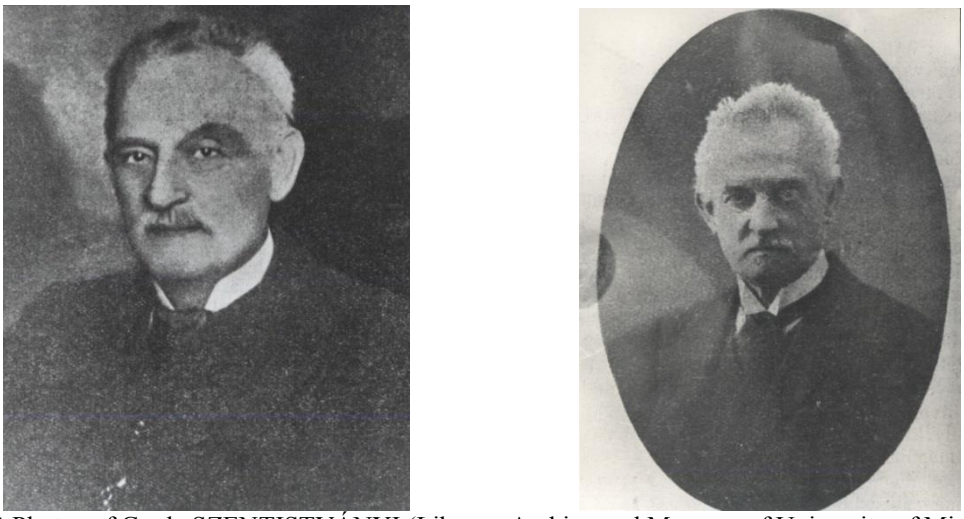


Fig. 1 Photos of Gyula SZENTISTVÁNYI (Library, Archive and Museum of University of Miskolc)

Later, *the cheerful professor was worn out* due to leaving the ancestral residence very much; one half of his soul, however, remained in Selmecbánya. Fortunately, *his good temper returned soon* to the greatest delight of his colleagues and students.

In *1919* the *Academy* named at that time *College of Mining and Forestry* moved to *Sopron* where Professor SZENTISTVÁNYI was working even for *7 years leading the Department* till his retirement in *1926*. After that he could enjoy *his pension period just for 1.5 years* because he underwent an operation, his heart weakened, he had pneumonia; and after a two-week suffering he *passed away in Sopron* at the age of *74* on *January 16th, 1928*. In the literature *Antal HORNOCH* wrote about it as follows [1]:

"Our College was thrown into deep mourning: Gyula SZENTISTVÁNYI who was the head of the Department of Surveying for 24 years, Uncle Pista of all of us closed his kind eyes for ever on January 16th, 1928."

His leading teacher's period at the Academy coincided with certain reforms concerning the training institute. The name of the Academy became *College of Mining and Forestry* from 1904. The 3-year-training increased up 4 years, however, the *mining*, *siderurgical*, and *metallurgical sections/classes* remained. Being the appointed professor of mine surveying SZENTISTVÁNYI taught the students of all the three sections *theoretical and practical geodesy and mine surveying* in relatively high number of hours. It meant *the mining engineers to be* subjects such as *Geodesy I* (4l + 8p) for the second class; *Geodesy II* (4l + 6p) for the third class; and *Mine Surveying* (3l + 6p) for the forth class. Of the just-mentioned subjects students of the other two classes taught just only Geodesy I [6]. In his lectures and explanations he mixed well and intensively theoretical knowledge and needs of a mining engineer in practice. In addition to his teacher's work it must also be mentioned that he did the connection and orientation measurements at the mines of *Petrozsény*, Dorog, and Ajka which fixed the mining claims. For the first one he received *minister's acknowledgement and appreciation*.

He kept strong relations with home mining, and solved even the "*most difficult mining tasks*" successfully as well.

His *24 year engineering experience* and *24 year professor's work* in academic training, which covered *48 years* in his life, meant the fusion of practical and theoretical knowledge related to his personality, and it is reflected his mining/especially mine surveying publicist activity and instrument constructor's work in mine surveying.

Among the *results of his literature activity* his books and studies about experimental and mine surveying novelties and mining and geodetic problems published in the Hungarian

Journal of Mining and Metallurgy (hereafter shortly JMM) must be outlined. Let us detail these without aiming at completeness [7]:

- *higher arithmetic*, Selmecbánya, 1904, pp. 238 (lithographic),
- *practical mine surveying*, Selmecbánya, Joerges Printing House, 1911, (pp. 662), (lithographic),

  (It is an improvement of Ottó CSÉTI's known book on mine surveying, providing it with a wider basis and improving it with comprehensive practical knowledge. Replacing the book used till that time which could be used safely not only by beginners but also mine experienced surveyors to find solutions to their raising problems.)
- *about the Carbonileum*, Journal of Mining and Metallurgy, 1895 (pp. 71-72),
- *about the difficulties in exploring the reef of gold of Módertáró*, JMM, 1896 (pp. 166-169),
- *geodetic studies at the city-planning exhibition of Dresden*, Journal of Mining and Metallurgy, 1904/1 (pp. 505-526),
- *slope measurement*, JMM, 1905/1 (pp. 393-422),
- *boundary triangulation of Jurgó village*, JMM, 1906/1 (pp. 593-632),
- *connection and orientation measurement*, JMM, 1907/1 (pp. 729-765),
- *base line surveys in Berlin, with BESSEL-type base line surveying device and JAEDERIN'S invar measuring tapes*, JMM, 1909/1 (pp. 2-30),
- *comments to the Géza GRIGERCSIK'S remark on meridian (déllő in Hungarian) computation based on observation*, JMM, 1911/3, JMM, 1911/1 (pp. 258-260),
- *to the determination of a meridian*, JMM, 1911/1 (pp. 553-559),
- *the new HEYDE-type cog-circle theodolite*, JMM, 1912/2 (pp. 497-501),
- *mining triangulation in Dorog*, JMM, 1918 (pp. 56-67; 73-83; 91-100),
- *a special task of connection and orientation surveys*, JMM, 1923 (pp. 267-271).

His book: *Practical mine surveying*, with which he met with recognition in a wide circle, is also illustrated with the photographs of its cover and some pages (see pictures of Figures 2 and 3).

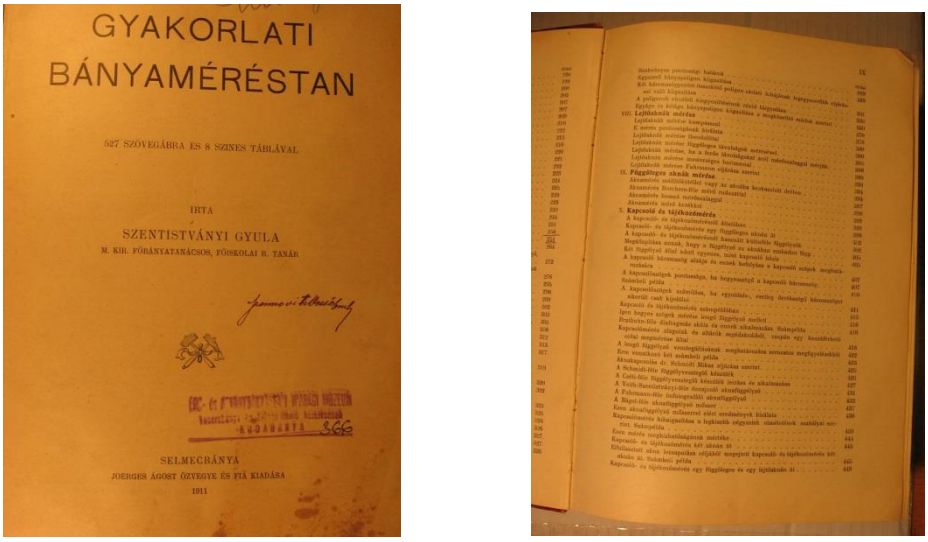


Fig. 2 Gyula SZENTISTVÁNYI: Practical mine surveying, the cover and a part of content of the book (Source: László SZABÓ retired lecturer)

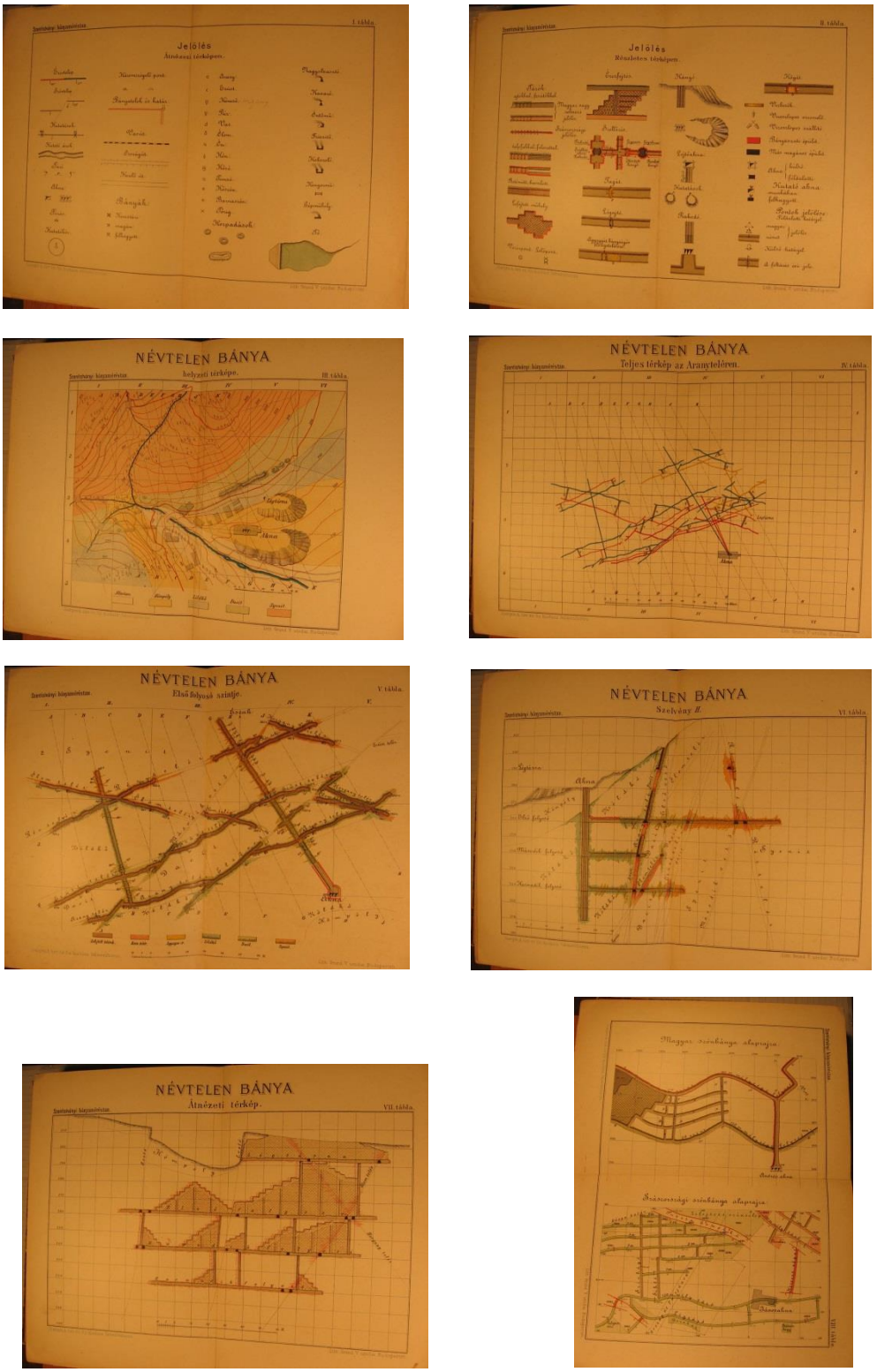


Fig. 3 Gyula SZENTISTVÁNYI: Practical mine surveying, some pages of the book about mapping legend and mining maps (Source: László SZABÓ retired lecturer)

It must be highlighted particularly that he made the solutions of the professional tasks performed by him known as *public property*.

His name is preserved by *more instrument constructions*. He gladly dealt with developing *instruments and accessories* to certain tasks of mine surveying or *their improvement*. By his

activity he gained an *international reputation*. Let's mention some of them with a short introduction not even aiming at completeness here either. These are as follows [1], [7]:

- *the improved VEIGHT-type plumbing device* (Figure 4)

(It was applicable for determining the rest/vertical position by drawing swinging. It was cheap and easy to use, and became an alternative of FUHRMANN's device. On a polished white glass plate the sharp profiles of ellipses drawn by the so-called pencil could have been identified well thereby the resting point of the plumbing device could have been drawn.),

- *application of the MANDRIN's electromagnetic field* to damping for connection measurements (It enabled to fix the plumb more quickly.),
- his Selmec disk,

  (He made the SCHMIDT's device suitable for centric plumbing.),
- *SZENTISTVÁNYI's stretching stand* (see pictures of Figure 5)

  (It is a modification of CSÉTI's similar device thereby it provided more general use. About it the following description can be found in the Central Mining Museum of Sopron. "Denomination: Iron stretching set (SZENTISTVÁNYI'S side-arms). The CSÉTI's stretching stand was mounted with side-arms by SZENTISTVÁNYI to make it suitable for standing position. A fixing sleeve is shrunk on the lengthening rod, and its horizontal position is controlled with a tube level. The stand disk (side arm) is fixed to the tribach on which you can set up the instrument (a theodolite). No doubt that this stretching stand is manufactured in the workshop of Department of Mine Surveying and Geodesy, College of Mining and Forestry in Selmecbánya. From the arrangement of the instrument case you can draw the conclusion that a tribach and an instrument-fixing support is missing." *Source: Attila SZEMÁN* chief museologist, Central Mining Museum, Sopron),
- *the electronic targets of slope measurement*,
- *the Selmec direction-fixing device* (Figure 6).

  (It was mainly domesticated in mines of explosive gases.)

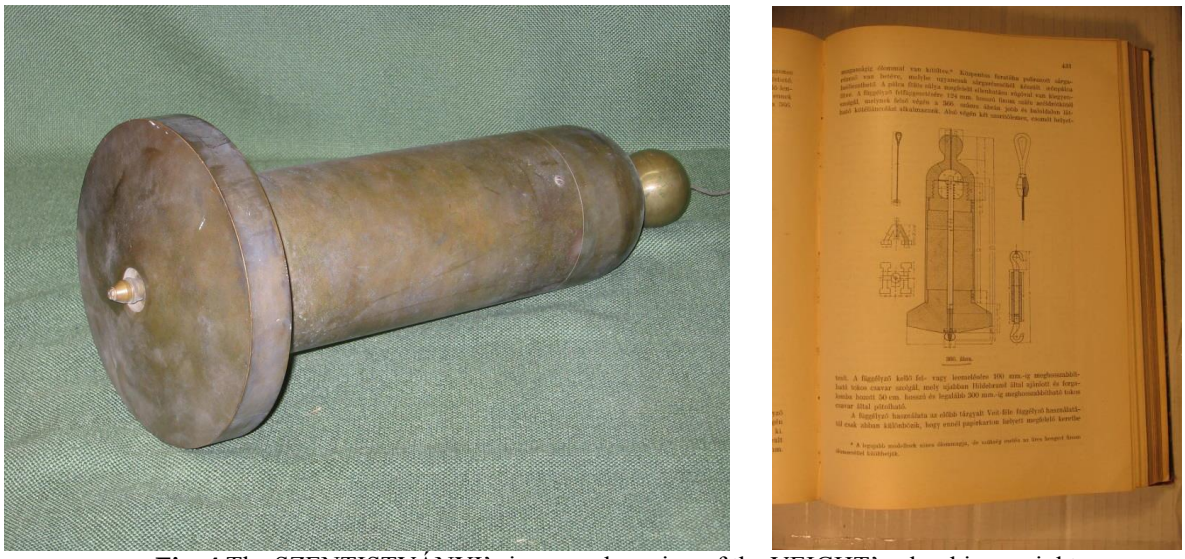


Fig. 4 The SZENTISTVÁNYI's improved version of the VEIGHT's plumbing weight (Department of Geodesy and Mine Surveying, University of Miskolc)

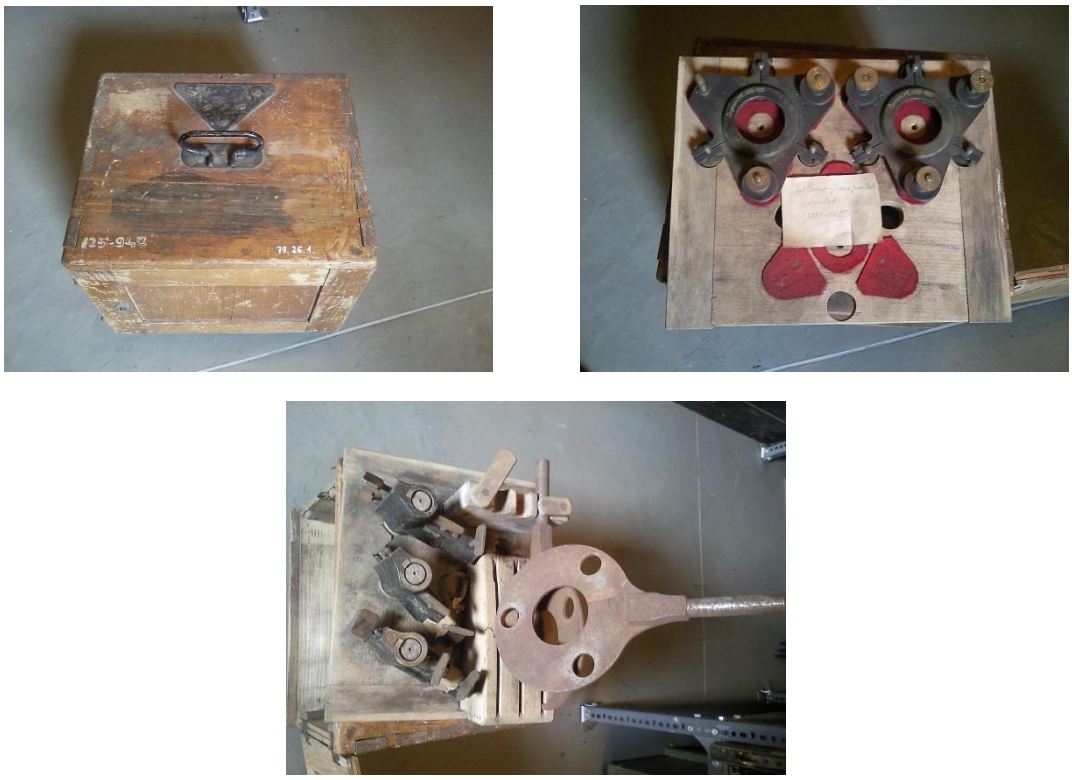
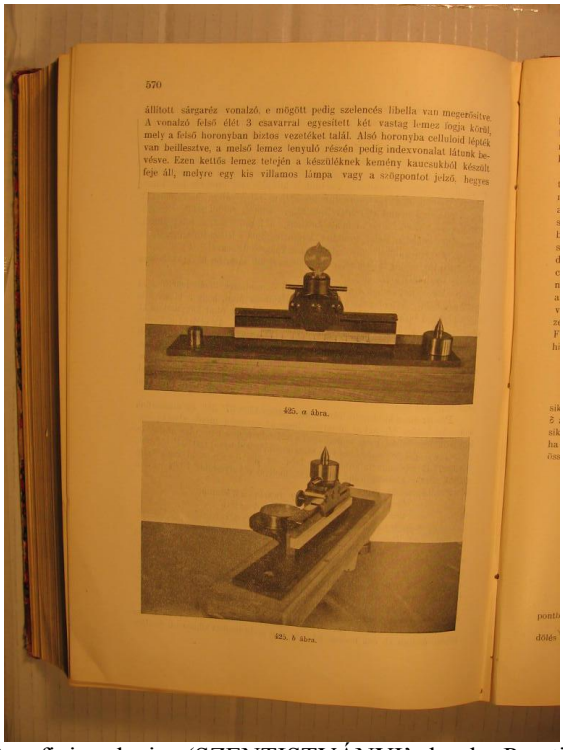


Fig. 5 Photos of SZENTISTVÁNYI's iron stretching set
(Source: Attila SZEMÁN chief museologist, Central Mining Museum, Sopron)



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állított sárgaréz vonalzó, e mögött pedig szelencés libella van megerősítve. A vonalzó felső élét 3 csavarral egyesített két vastag lemez fogja körül, mely a felső horonyban biztos vezetéket talál. Alsó horonyba celluloid léptek van beilesztve, a felső lemez lenyuló részén pedig indexvonalat látunk bevésve. Ezen kettős lemez tetején a készüléknek kemény kaucsukból készült feje áll, melyre egy kis villamos lámpa vagy a szögponfot jelző, hegyes

425. a ábra.

425. b ábra.

Fig. 6 Selmec direction-fixing device (SZENTISTVÁNYI's book: Practical Mine Surveying)

He liked his students, and they also adored him. He was not only an *excellent teacher* but also a *very experienced mining engineer*. His charming personality also enhanced his students' interest in surveying sciences. His good humour and smile even deepened absolute

confidence in him without damaging respect. He founded his way into his students' hearts, and he was liked by each member of home mining community. This is also verified by literature [1] which informs the reader about a touching event that in autumn of *1927* the following happened to the retired professor *at a mining congress in Sopron*:

„…Lots of his admirers gathered round him with spontaneous enthusiasm, the full staff of mining and metallurgical faculties being there, and revealed their love and affection by singing the most beautiful Selmec song."

In Figure 7 his portrait and sculpture, which can be found at the Department of Geodesy and Mine Surveying, University of Miskolc, can be seen.

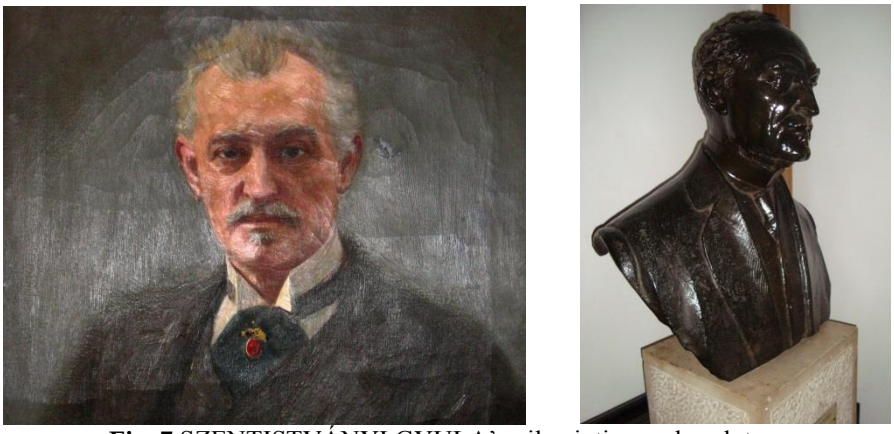

Fig. 7 SZENTISTVÁNYI GYULA's oil painting and sculpture
(Department of Geodesy and Mine Surveying, University of Miskolc)

Gyula SZENTISTVÁNYI's body was laid in state at the College of Mining and Forestry in Sopron. In the name of the College Senate *Jenő TETTAMANTI* former rector *delivered a speech*. In it, for example, his personality was described as follows:

„You kept your kind and gentle look showing your great intellectual ability; your cheerful philosophy of life, and charming lively mood for even your old age with youthful activity."

After TETTAMANTI's speech Uncle Pista was escorted in traditional mining 'salamander' march to his final resting place in the local evangelic cemetery. There, in the name of the youth a mining engineer, *László JUHÁSZ* still appreciated the careful professor, the great friend of students.

Conclusions

The author of this study made an effort to introduce Gyula *SZENTISTVÁNYI* (*Uncle Pista*), a former *professor of mine surveying* at the *Academy/College of Selmec* truly to life on the basis of reviewing the *literature* and *museum background*. It turns out from the article that Professor SZENTISTVÁNYI was one of the outstanding figures of his era in mine surveying/geodetic special field which was merited by *his literature activity reflecting also his practical experience*; *several new instruments and improvement of former ones* (their detailed descriptions are in the full paper); and his *much-loved LECTURER temperament*. His activity was known and recognized both in Hungary and abroad. Highly appreciating the afore-mentioned we, his successors, remember the *sometime prominent academic professor of Selmec and Sopron*, the *former head of department, and the late excellent representative of mine surveying profession* with a grateful heart.

Acknowledgement
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The author is grateful to Attila SZEMÁN (chief museologist, Central Mining Museum, Sopron) and Attila SZENDI (chief archivist, Library, Archives, Museum, University of Miskolc) for special literature and some photographs which were made available for him. In addition, many thanks to László SZABÓ retired lecturer for his photos connected to the book 'Practical Mine Surveying' and Gyula SZÁDECZKY-KARDOSS for his help in this research work.

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http://www.nyme.hu/index.php?id=17645&L=1&id=17645

E-TOURISM AS PROMOTION OF MINING TOURISM

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ABSTRACT
Nowadays, information and communication technology found its stable place in tourism. Web browsing and accommodation online booking, virtual tours of museums, historic and cultural objects, and the use of navigation systems is becoming an integral part of our lives. Slovakia is a country with a rich history focused on the extraction and processing of mineral resources and has great potential in terms of tourism of mining. The contribution is focused on a brief description of information - communication technologies as well as other modern systems with application in of mining tourism.

Keywords: tourism mining, GNSS, photogrammetry, virtual tour

INTRODUCTION

Slovakia belongs to the countries with a rich history of mining dating back to the Bronze Age. The emergence of Hungary (10th century) began to raise the importance of mining. The territory of Slovakia is ranked through mining of raw materials between the its most advanced part. Arrival of German immigrants, there was a boom especially in the 14th and 15 century, when Hungary was the largest producer of precious metals in the world. These were obtained mainly in Kremnica and Banská Štiavnica. In the 18th century, Slovakia moved to the forefront with the development of mining technology and mining vocational education. In Banská Štiavnica was established the first technical university in the world. [16] From the Banska Stiavnica comes the first written mention of the use of gunpowder in mining of ores in the world (successful testing of gunpowder for rock cutting 16 2 1627). In the 90s of the last century there was a significant attenuation of ore mining. Currently, the only deepwater mined coal and the Upper Nitra Basin and Handlovská (Handlová, Novaky, Prievidza) and the Velky Krtíš (Bana Dolina).

In Slovakia there are many unique and excellent monuments that deserve documentation and archiving as part of the cultural heritage of Slovakia. Nowadays, modern technologies allow such creating spatial models workings and make heritage to the general public through virtual reality, video and audio links - creating genuine multimedia guides use QR codes and readers in the mobile phone can replace a wizard application WhereIGo in certain types of GPS devices and mobile phones combines the game and learning.

MINING TOURISM

One of the possibilities to acquaintance of geological heritage is geotourism, which includes montane (mining) tourism. Regards the tourism, which is focused on those areas of the Earth, that have the geological aspect of exceptional value. [2]

For the presentation of geological heritage are also geological and mining focused educational sites, educational trails, museums and exposition in nature, disclosed abandoned mining works and other engineering works associated with mining and geo-historical journey.

Nature trails by Čerovský [1] are defined as marked educational routes through remarkable natural and cultural territories and areas in which they are selected some significant objects and phenomena that are intended to explain opinions. The description is mostly on information panels that are built on the trail educational trails. Educational trails are a part the information system, which among them includes the educational sites, historical tours and museums in the countryside.

In Slovakia is currently 12 educational trails with a mining theme and a total length of approximately 45 km. Individual routes vary in length and intensity. These paths obviously containing more stages with information panels, descriptive text with maps and photograph/graphical appendixes.

E-TOURISM

The e-Tourism concept can be defined as the analysis, design, implementation and application of information technology and e-commerce solutions in the tourism industry; as well as the analysis of the respective economic processes and market structures and customer relationship management. [4]

From a communication science perspective, eTourism can be also defined as every application of Information and Communication Technologies (ICTs) within both the hospitality and tourism industry, as well as within the tourism experience.

Modern technologies bring many social changes and significantly extend to all areas of life. One of the most important tasks in information and communication technologies play internet. His role in tourism is currently beyond reproach. Among other things, allows the detection of information about destinations, products offered by travel agencies, travel-related information (search and route planning), airline reservations and accommodation. In addition to this single technology but there are many others that assist the development of tourism.

WEB SERVICES

Web service is defined by the W3C (World Wide Web Consortium - a consortium producing free standards for the World Wide Web) solution, as together applications can communicate and exchange information with each other via the Internet.

The tourism industry is the most used web sites that allow presentation service providers (travel agencies, airlines and accommodation), online services (on-line reservation systems), extensive use of hyperlinks, e-mail communication, paging services according to specified requirements. Website is currently a major marketing and communication tool tourism service providers, inter alia, increase the efficiency of services and on the other hand, allow providers reduce costs. Nowadays, there is already number of online reservation systems, such as accommodation. Booking.com BV company [5] and TripAdvisor site [6] with a global reach. Such systems are also subsequent feedback, in which the customer fills out a questionnaire assessing the level of the hotel and the services provided.

One of the companies and organizations that maps, documents and presents the history of mining in Slovakia is Association the mining societies and guilds in Slovakia. As stated on its website [3] focus on the disclosure of current events mining in Slovakia, its history, activities of interest groups. On their website they have a portal dedicated to mining nature trail, which closely monitors the situation in Slovakia. [7]. Similarly, you can also page „Educational trails of Slovakia“ [8], which, as mentioned in the introduction „is trying to document all of nature trails and locations in Slovakia“.

From other websites dedicated to mining industry may be mentioned:

- project of the Slovak iron path [9] Slovak iron path is a cultural journey combining site of a former iron ore mining, production and processing of iron and other metals. It is part of the Central-European Iron roads,
- Slovak mining path [10] - carrier project is a civic association - Association of Miners' unions and guilds,
- The "Multimedia Guide mining tourism" is a map portal designed to promote tourism attractions of mining from different mining sites in Slovakia. Allows disclosure and sharing of multimedia-based documents containing text, images, videos, animations and sound recordings. [11]

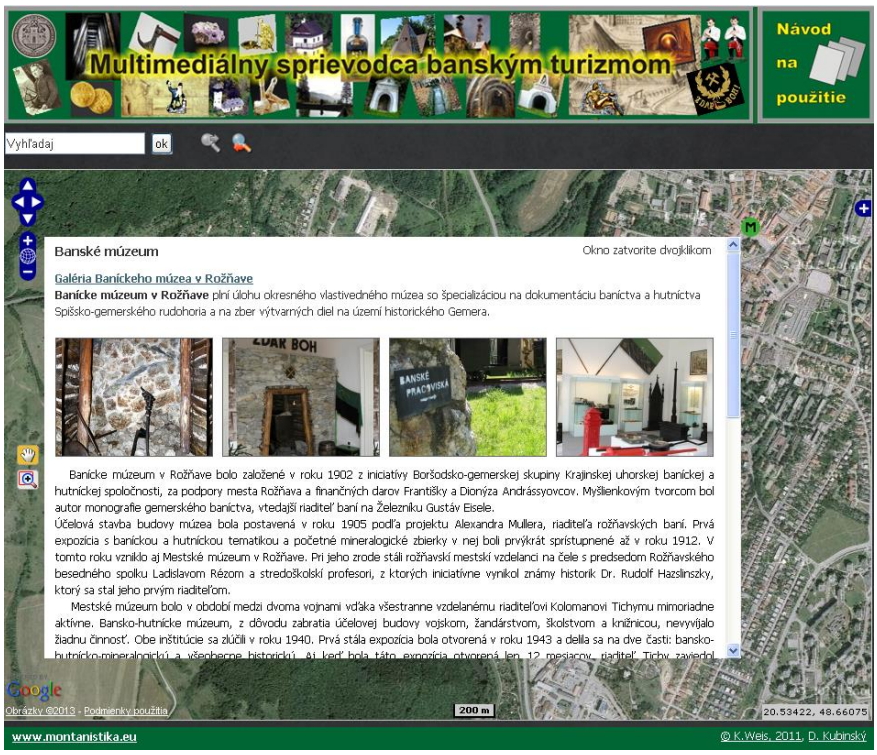

Fig. 1 Map portal "Multimedia Guide mining tourism"

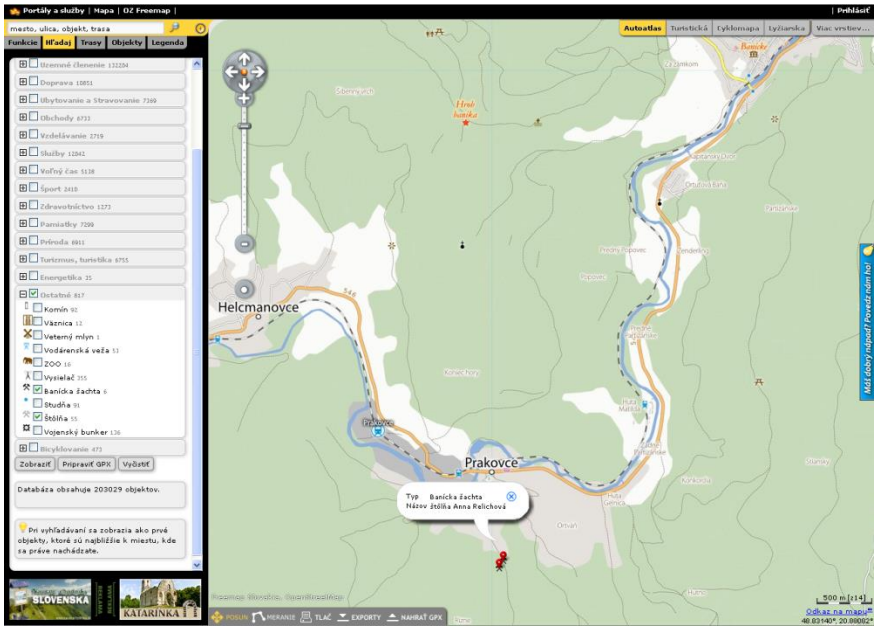

Fig. 2 Map server FreeMap

MAP SERVER

Another technology using the internet and presentation of data through is the map server. Map servers are programs operating on client-server architecture, for processing geographic data. Simply put, they're basically geographic information systems, but they are operated only by parameters - lyrically - and non-interactive. Collaborate with any of the web sites that sell them the necessary parameters from web form. These are processed and returned back is either a file with a map, or a query result. [12]

One of mapping sites providing information on mining is the map server of the civic association Freemap Slovakia. [14]

SMARTPHONE

A forerunner of Smartphone can be regarded as a PDA (Personal Digital Assistant), or other designation palmtop. The initial mission of PDAs was to organize of time and contacts, but progressively expanded and supplemented by additional features such as navigation (GPS), play videos and music, etc. Currently are considered outdated and are replaced by smartphones.

Smartphone is a mobile phone that uses an advanced operating system and application interface that allows installation or modification programs. Phones contain most of the operating system, for example, Symbian OS, Windows Mobile, iOS, Android, or PalmOS.
Today it is commonplace internet connection in the mobile phone. The user can thus obtain information directly through the site or application specific commitment on the location links to the GPS.

GLOBAL NAVIGATION SATELLITE SYSTEMS GNSS

Global Navigation Satellite System is a service that allows satellites through autonomous spatial positioning with global coverage. Users of the service used by the receivers that based on signals sent from satellites allow to calculate their position to within tens of meters to the unit. Accuracy of special or scientific applications can be up to several centimetres to millimetres.

In 2013 a fully operational NAVSTAR GPS and Russian GLONASS, which was put into full operation in 2012. At the stage of building the European system Galileo.

So by reducing prices devices and the implementation of the GPS module to mobile devices (mobile phones, tablets) increased the use this technology in the field of entertainment and tourism. Satellite navigation technology has helped to overcome some of the risks associated with the active use of leisure time. Receivers allow the journey in unfamiliar areas, are used to determine the position, direction, speed and distance. Many devices contain applications enabling detailed route planning, recording and display of points of interest (POI), view the profile and intensity of the route, detailed navigation while travelling by car, etc. Maps created for navigational instruments are sufficiently detailed and frequently updated.

One of the modern forms of tourism making use of GPS devices is also geocaching. Geocaching is a tourist, navigation and outdoor activities, whose main task is to find the hidden boxes called. cache, as specified geographic coordinates. To obtain the coordinates registration is required on the website [14], which also serve to record keeping and statistics. Through cache can promote a more attractive destination.

In Slovakia, there are more of caches dedicated to the mining industry, its history and monuments. Near the town of Rožňava is the Turecká mining trail in the nearby there are also hiding. There is a built of Kremnica series named "The way of miners" series contains 26 caches, 3 caches older data and one earthcache. Overall length is approximately 13 km, cumulative ascent 630 meters. For each of them is about 200-210 findings from their inception (June 2011), so it can be said that the establishment and publication of the crowd in a minimum of 200 guests. Search often engage in small groups and families with children, so the traffic is likely to be much higher.

LOCATION BASED SERVICES

Location Based Services (LBS) are relatively new concept, but its implementation is already currently often encountered. LBS offer electronic content (texts, images, sounds, applications, etc.) to your users based on location, their location (eg, if the traveler is in the historic center, you can download the old city travel guide or map things).[15]

Ways of using Location Based Services can be the following [15]:

1. Information services - allow searching local events and objects of interest (restaurants, hotels, festivals etc.) and highlight the tourist attractions using an electronic guide, It is providing local weather forecast and many more.
2. Navigation services - including a tour or car navigation.
3. Social Services - This category includes primarily the use geosocial networks (which can include Foursquare, Gowalla, Google Latitude or Facebook places), which basically normal communication social networks enriched by new geolocation feature.
4. Promotional services - are usually communication channel for marketing commercial entities that are trying to reach potential customers various advertising elements
5. Monitoring and management services - this type of service tends to be used for fleet management and mobile sources. These activities have recently identified the concept of fleet-controlling.

CONCLUSION

Slovakia is a country with a rich mining history and traditions and has plenty to offer to foreign visitors. Young people in particular are closely related to information and communication technologies, are wont to use them regularly, so their application eg. through games and competitions they can attract and entertain. Increasingly abandons the traditional holidays and looking for the possibility of active rest in conjunction with GPS technology. Phenomenon of our age is the internet. It is a relatively quick and inexpensive option to increase awareness about interesting destinations. E-tourism is currently developing rapidly and is progressing and is often used in many areas of our lives. Significantly changing tourism in many aspects and is often used in marketing, e-business, management, destinations, transport and logistics, modeling and forecasting, promotions and sites below.

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GEOTOUR & IRSE 2013
Strategies of building geotourist and geoheritage attractions
IRSE: History of Central European Mining and its protection
(Conference Proceedings)

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