Geotourism potential in the Podhale, Orava, Liptov and Spiš regions (Southern Poland/Northern Slovakia)

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ABSTRACT
Tatra Mountais are the most attractive place in the Polish and Slovak border. It is caused of unique nature, landscapes and history. Tourists who traveling to Tatras are accommodated in the villages and cities around Tatra Mountains in 4 ethnographical regions (Podhale, Orava, Liptov and Spiš). This places also offer a good regional food, culture events or entertainment (e.g. spa & wellness, ski resorts, thermal water fun complexes, etc.). The geodiversity around the Tatra Mountains gives also an opportunity to make various geotourist attractions (geosites) in this region. The article presents a map of over 200 potential locations which can be used as the geosites. All of them have been categorized by the morphological type of the site. There are geological outcrops, riverbeds, lakes, caves, peat bogs, landscapes, landslides, springs, etc. Some of this places are well known in tourism (Chopok Mountain), but some of them are unknown, hidden and not described in tourist guides (Belá Landslide). The geosites are very interesting from the geological, geomorphological or hydrological point of view, but they need to be discovered and prepared for tourism. The geotourism gives this opportunity and the region around Tatra Mountains can gain next tourist attractions: geosites, educational paths or even geoparks.

Key words: geotourism potential, geosites, geotourism categorization, Podhale, Orava, Liptov, Spiš regions

INTRODUCTION

Geotourism deals with inanimate nature, earth sciences: especially geology, geomorphology and landscape, (Hose, 1995, 2000; Słomka, Kicińska-Świderska, 2004; Joyce, 2006; Dowling, Newsome, 2006, 2010). The main purpose of destinations in geotourism are geosites: geological outcrops, quarries, landscapes, riverbeds, peat bogs, springs, etc.

Podhale, Orava, Liptov and Spiš are ethnographical regions located around Tatra Mountains (Fig. 1). It is the best location for geotourism in Poland and Slovakia. There are amazing landscapes, gorges, outcrops, river valleys and many interesting places which can be used in geotourism. In this paper author proposed a map of over 200 geosites located around Tatra Mountains which are assigned to one of the eleven categories.

RESEARCH AREA

The study area is located in following physical-geographical regions: Zakopane Basin, Spisz – Gubałówka Foothills, Kotlina Orawsko – Nowotarska, Pieniny and a part of Beskid Żywiecki and Gorce in Poland (Kondracki, 2010) and Oravske Beskydy, Podbeskydská brázda, Podbeskydská vrchovina, Oravská kotlina, Oravská Magura, Oravská vrchovina, Skorušinské vrchy, Podtatranská brázda, Chočské vrchy, Podtatranská kotlina, Kozie chrbty, Hornádska kotlina, Levočské vrchy, Spišská Magura, Pieniny and a part of Ľubovnianska vrchovina, Volovské vrchy,

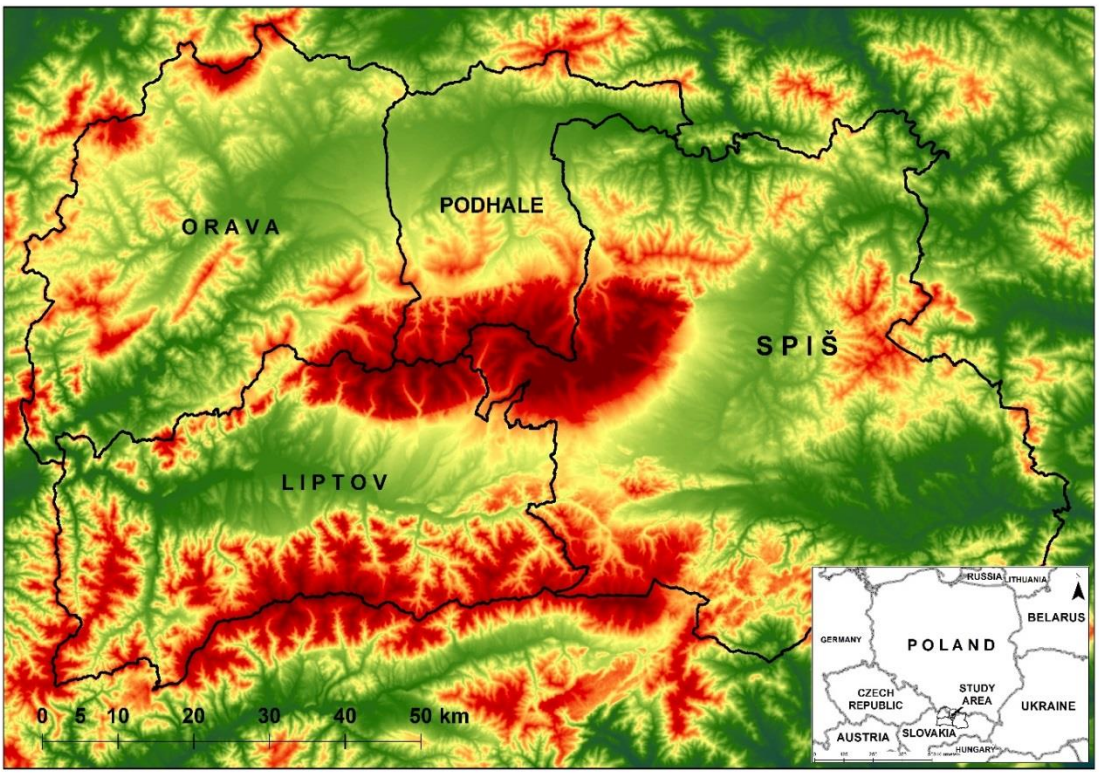


Fig. 1 Research area with ethnographical regions. Source: Administrative map of Poland, available online: www.codgig.gov.pl, administrative map of Slovakia, available online: https://www.geoportal.sk.

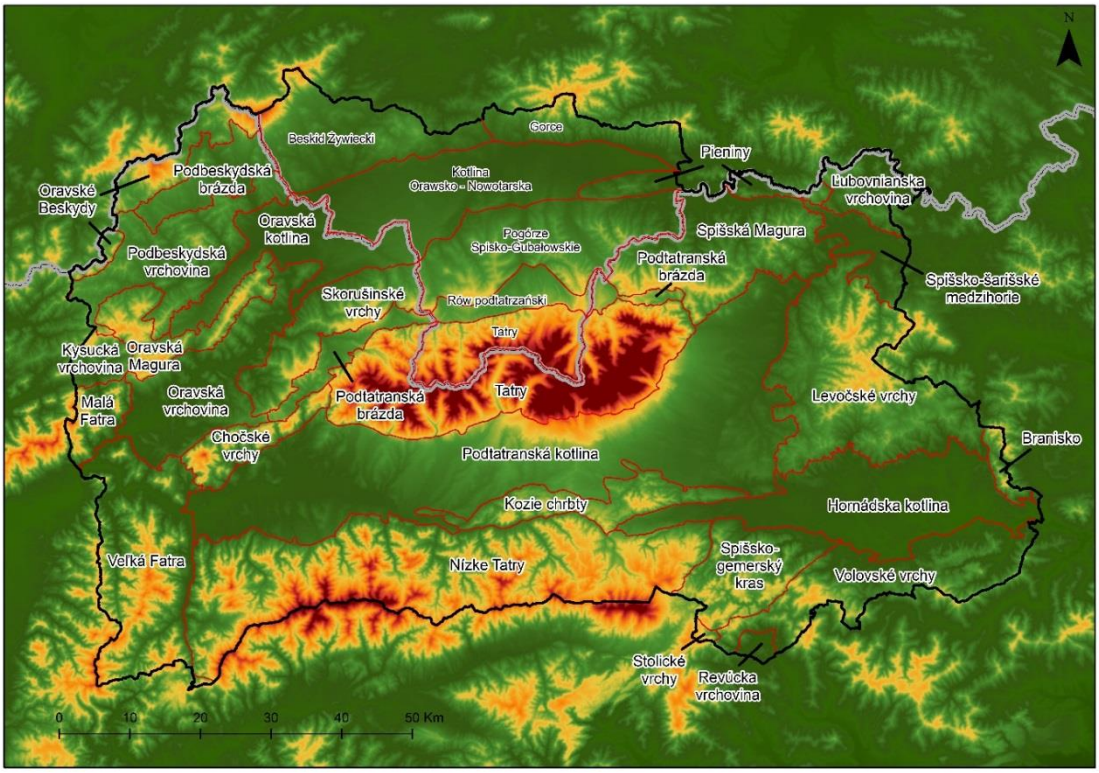


Fig.2 Physical-geographical regions via Kondracki and Mazur & Lukniš, Source: Kondracki J., 2010, Geografia regionalna Polski, PWN, Warszawa; Urbánek J., Beták J., Jakál J., Lacika J., Novotný J., 2009, Regional geomorphological division of Slovakia: old problem in new perspectives, Slovak Geography at the Beginning of the 21st Century, Geographia Slovaca, Geografický ústav SAV, Bratislava, 26, s. 237-259.

Nízke Tatry, Veľká Fatra, Malá Fatra, Kysucká vrchovina, Spišsko-gemerský kras, Revúcka vrchovina, Branisko and Spišsko-šarišské medzihorie in Slovakia (Mazur & Lukniš, 1986) (Fig.2). Geology and relief of this area are very diverse.

From the geological point of view, the Central Carpathian Paleogene (Podtatranská Skupina/Flisz Podhalański) has the largest area. It is built from sandstones and shales of the Borove (warstwy szaflarkie), Huty (warstwy zakopiańskie), Zuberec (warstwy chochołowskie) and Biely Potok (warstwy ostryskie) Formations (Gołąb, 1954, 1959; Gross, et al., 1980, 1984, 1993, 2008; Watycha, 1959; Janocko, et al., 1999, 2000). This geological formations it can be seen in Zakopane Basin, Spisz-Gubałówka Foothills, Oravská Magura, Oravská vrchovina, Skorušinské vrchy, Podtatranská brázda, Podtatranská kotlina, Hornádska kotlina, Levočské vrchy and Spišská Magura.

Orawa-Nowy Targ Basin (Oravská kotlina) is located on the north from the Spisz-Gubałówka Foothills and Oravská Magura. In Paleogene this bending occurred and the lake was formed. In the Pleistocene, the fluvioglacial gravels from Tatra rivers was accumulated in the lake up to 300 m. 10000 years ago, when the climate was warmer than in Pleistocene, the peat bogs have begun to form and they covered almost a half of this area nowadays (Obidowicz, 1988; Łajczak, 2009).

Pieniny Klippen Belt is located on the north from the Central Carpathian Paleogene. There is a range of Jurassic and Cretaceous sedimentary rocks (limestones, dolomites, marles, radiolaries). It is a border between Outher and Inner Carpathians (Birkenmajer, 1958; Nemčok et al., 1990).

Nízke Tatry Mountains and Chočske Vrchy Mountains are built from sedimentary rocks of Križna and Choč Nappes. In the Kozie Chrbty Mountins there are very interesting geological structure. There are magma rocks: basalts, porfires and andesites belong to Choč Nappe (Gross, et al., 1993; Biely, et al. 1997; Vozar, 1977).

The most northern parts of the study area (Gorce, Beskid Żywiecki Mountains, Oravske Beskydy, Podbeskydská brázda, Podbeskydská vrchovina) are built from sandstones of Magura Nappe (Gross, et al. 1993; Watycha, 1977), (Fig. 3).

In Slovakia, close to the faults, there are a lot of travertines, which form a very interesting rock formations (Bizubova, 2008).

In the central part of the research area there are Tatra Mountains, a mountain range originating from the Alpine orogeny. It is built from kristalinicum rocks and sedimentary rock from 3 nappes: Autochton, Križna and Choč (Passendorfer, 1983). The geology and relief of the Tatra Mountains are not the main purpose of the research but there are part of almost every landscape geosite (Fig. 4).

The plenty of geomorphological, egsogenic processes which results it can be seen in the research area, additional raise the geotourism value of the area. There are: deep river valleys (e.g. Prosiecka Dolina Valley (Fig. 5), Jarabinsky Prielom George), interesting river connections (e.g. Orava and Váh or Tichý Potok and Kôprový Potok), limestone rocks (e.g. Skalná päsť Outcrop, Sedem kostolov Outcrop (Fig. 6), Obłazowa Rock), travertine formations (e.g. Vyžne Ružbachy, Bešeňova, Siva Brada), landslides (e.g. Jezersko, Osturňa), caves (e.g. Demänovská Jaskyňa Slobody (Demänovská Cave of Liverty), Dobšinská Ľadová (Dobšinská Ice Cave), Važecká), peat bogs (e.g. Bór na Czerwonem, Slaná Voda) etc.

Also important is the human impact and the geosites can also be made in quarries (e.g. Rogoźnicka Skałka, Kvetnica (Fig. 7), Tvrdošín) old mins and adits. Also interesting for geotourism are old buildings, which were made of rocks: churches (e.g. Chochołów, Spišská Kapitula) or castles (e.g. Spišsky Hrad, (Fig. 8) Czorsztyn).

The diverse geological structure and relief

are the basic criterion to make the geotourism on researched area.

METHODS

In order to crate the geotourist map of Podtatrze Region the author used the following methods:

- Review available databases with geosites in Poland and Slovakia
- Field works, where every geosite was found, marked in GPS, described and photographed
- Consultations with specialists how each geosite was made
- Making a geotourist card for each geosite (Tab. 1)
- Categorization of the geosites using the origin criterion
- Making the geotourist map in ArcMap program

THE MAP

The geotourist map of Podtatrze Region presenting 203 geosites, which are belong to the one of eleven categories:

- Landscapes 40 geosites
- Outcrops 73 gosites
- Quarries 15 geosites
- Peat bogs 6 geosites
- Riverbeds 16 geosites
- Springs 16 geosites
- Waterfalls 5 geosites
- Landslides 6 geosites
- Lakes 8 geosites
- Caves 8 geosites
- Others 10 geosites (Fig. 9)

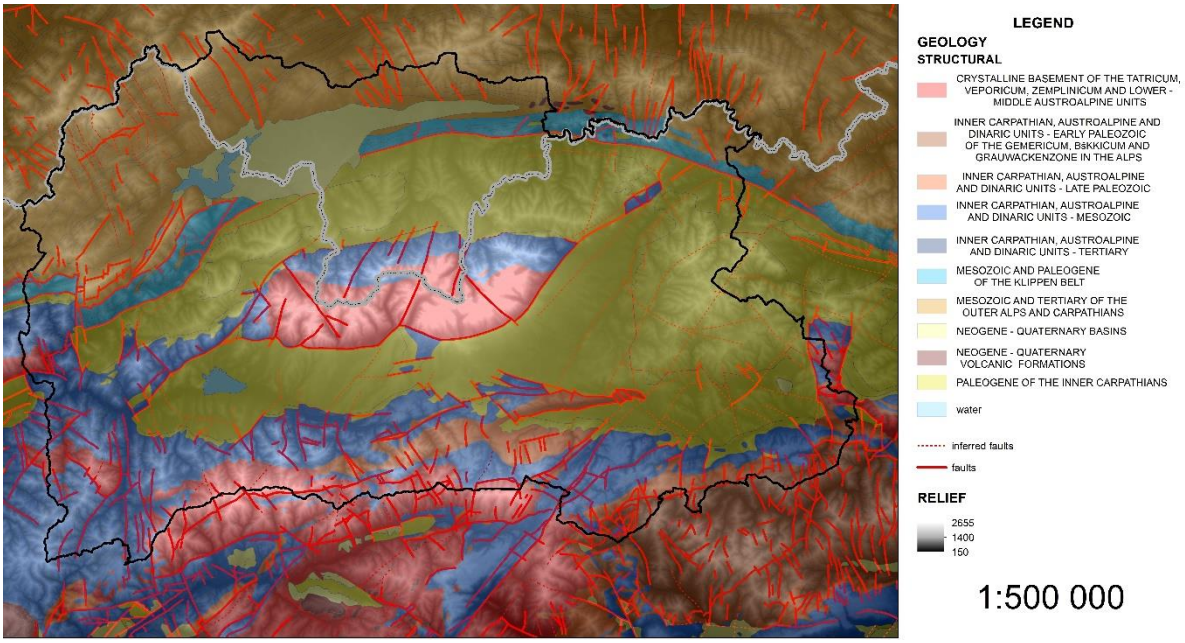


Fig. 3 The geological map of research area. Source: Lexa, J., Bezák, V., Elečko, M., Mello, J., Polák, M., Potfaj, M., Vozár, J. (eds.), Schnabll, G.W., Pálenský, P., Császár, G., Ryłko, W., Mackiv, B. (coeds.), 2000: Geologická mapa Západných Karpát a priľahlých území, 1 : 500 000, MŽP SR a ŠGÚDŠ, Bratislava

Fig. 4 High Tatras from Popradska Kotlina (Poprad Basin). Photo by: A. Chrobak

Fig. 5 Prosiecka Dolina Valley
Photo by: A. Chrobak

Fig. 6 Sedem kostolov Outcrop
Photo by: A. Chrobak

Fig. 7 Kvetnica quarry. Photo by: A.Chrobak

Fig. 8 Spišsky hrad. Photo by: A. Chrobak

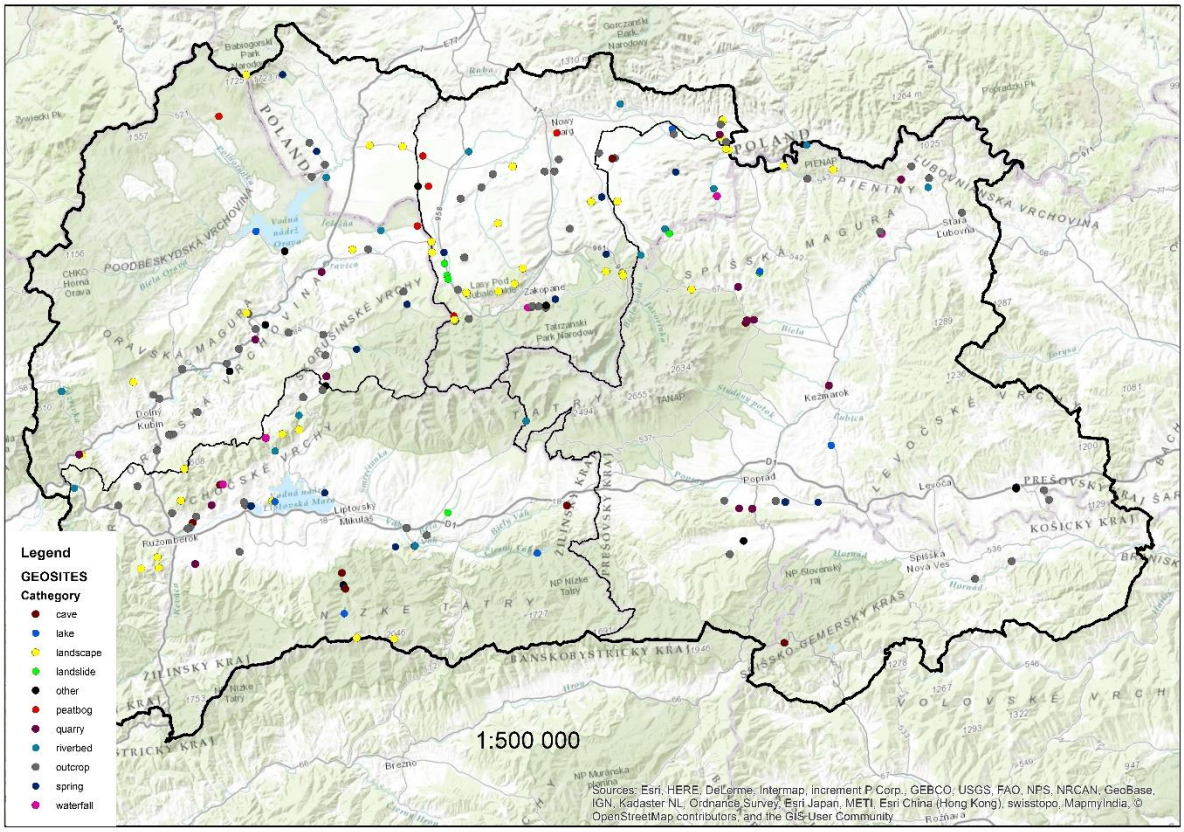


Fig. 9 The geotourist map of Podtatrze Region. Source: own research

Each geosite is precisely described in the information card (tab.1). There are informations about the name, location, belong to mesoregion, categorization, accessible and the physical-geographical description. There is also a location map and the picture of the geosite. The map was made in the ArcMap program and it can be still modified. For the purpose of this contribution only geosites with their categories are presented on the map with topographic background. Author will add more informations about tourist development in the future. From 203 geosites there are 59 in the Spiš Region, 53 in the Podhale Region, 46 in the Orava Region and 45 in the Liptov Region.

Taking to account the categories, the most numerous group, 73 geosites, are outcrops. There are single rocks, natural outcrops, stratotypes, etc. On the second place are landscapes – 40 geosites. These two categories represent more than a half of all geosites. On the third place there are riverbeds (gorges, canyons, river connections) and springs (thermal springs and mineral springs) – 16 geosites. Next there are quarries – 10 geosites, lakes and caves – 8 geosites, peat bogs and landslides – 6 geosites and waterfalls – 5 geosites. 10 geosites belong to group "other". There are old buildings, dams, etc.

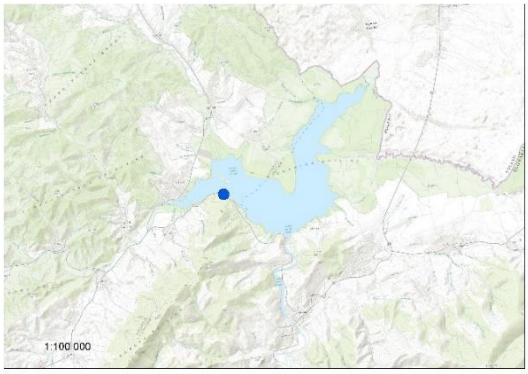
Some of the geosites (57) were described earlier and they are in the geodatabases belongs to: Polish Geological Institute (22 geosites), AGH Cataloge of the geosites (3 geosites), Polish Academy of Sciences (3 geosites), State Geological Institute of Dionýz Štúr (33 geosites).

DISCUSSION

Geotourism potencial in the Podtatrze Region depends of diverse geological structure and interesting relief. Presenting geosites is just the beginning to make there one of the most interesting geotourist places in the Central Europe.

Nowadays, the Podhale, Orava, Spiš and

Tab. 1 The example of information geosite card
GEOSITE CARD NO. 167

Name of the geosite	***ORAVA LAKE***
Longitude & Latitude	19°30'44,52"E 49°24'04,90"N
Location	Slanička Osada, Námestovo, Žilinsky kraj, Slovakia
Mesoregion	Oravská kotlina
Geological region	Neogene sediments of Orava Basin
Property	Slovak Republic
Region	ORAVA
Category	LAKES
	
CHARACTERISTICS Orava Reservoir is the bigggest lake in Slovakia (346 mln m³). It was established in the years 1941 - 1954. It has three mainly functions: retention, energy and recreation. The concrete dam was constructed at the junction to the Black and White Orava. It is long at 291 m and 46 m-high. The bedrock is carted by thick-bedded layers of sandstone with a carbonate binder and a gray shales of Magura Nappe. The sandstones and shales are forming an anticline where the dam was built. The anticline is interrupted by a few faults and the largest fault is in its nucleus. Flysch bedrock with sandstones domination has a very good load-bearing capacity, but also permeability, due to the high porosity of sandstone. Five villages: Usti nad Oravou, Slanica, Osada, Orava Hamre, Lawkov and lower parts of cities and Namestovo Bobrov were flooded. The only remnant of them are now the Slanicky Ostrov located in the middle of the lake. It was the highest hill above the village of Slanica. **COMMUNICATION** The Orava Lake is located at Orava Region, close to the Polish border with Poland, between two major routes: the E77 motorway connecting Crakow and Budapest and road no.78 from Żywiec through the Korbielów, Namestovo to Oravske Podhradze. The largest town located close to the lake is a district town Namestovo. On the south - western shore there are many small resorts offering lodging and attractions associated with water sports on the lake. **REFERENCES** Mišik M., 1976, Geologické exkurzie po Slovensku, Slovenské pedagogické nakladateľstvo, Bratislava Kollar D., 1999, Orawa, Dajama, Bratislava	

Source: own research

Liptov Regions are seen as a places where tourists can stay for a night, eat well, see the highlanders culture and go hiking to the Tatra Mountains. Many historical objects, especially in Orava and Spiš Regions are opened for tourists, like Oravsky Hrad or Spišsky Hrad, but there are not many information about the geographical

background why this castles are where they are. Liptov Region has a very good places for recreation: ski centers (Chopok) and thermal baths (Bešeňova, Liptovsky Ján, Tatralandia), but there are not any information about the hot water, why there is and what causes it is so hot and good for health. Around spa in Vyžne Ružbachy there are many interesting travertine formations, but the informations about travertines in Vyžne Ružbachy are sparse and do not relate directly to the geology. Geosites which are in the Polish and Slovak databases do not have an information panels, sometimes are hard to reach and an ordinary tourist cannot find it e.g. Rogoźnicka Skała Quarry or there are currently unavailable Lisková Mohylky Outcrop.

Geotourism development can expose and show the most interesting places for (geo)tourists. A lot of people who are coming to the Tatra Mountains are interesting in nature and the processes which shaped the landscape around them. They will go to the new places with good access and accompanying tourists base.

Tatra Mountains are famous from the centuries and the culture of traveling there will stay, but maybe people choose the opportunity in the geotourism in the Podtatrze Region, which already has a good accommodation base, many places with good food and many other tourists attractions. Of course the amazing highlanders culture are also very important.

Especially Polish part of Tatra Mountain is overpopulated during summer and winter holidays, Christmas and long weekends. Maybe the geoturism in the Podhale Region is the way to reduce the number of tourists in the most attractive places in Tatras during the high season (Chrobak, 2014).

CONCLUSION

Geotourism has been grooving for 20 years and it has a huge economic potential. Tourists want to see new places, learn about Earth and how the earth make us. Nowadays people who make a geotourism attractions has a big development opportunities which creation new products. Geotourism is not only a tourism to inanimate nature, it is also revitalization old mines and quarries.

Geology and relief at Podhale, Orava, Liptov and Spiš Regions is very diverse. The best proof of that sentence is the presenting map with over 200 geosites. Region around Tatra Mountains has various geotourist attractions, there are 11 categories describing different geoatractions on the map both natural and anthropogenic.

Geotourism on the Podtatrze Region is slowly developing (57 geosites belong to the national geotourist databases) but with the good cooperation scientist, economists, managers, government and local people it can the better. Podtatrze Region can be the most interesting Region from the geotourism and cultural point of view in Central Europe.

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