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The digital cartographic reconstruction of the 1897 'Mátra Guide' (Hungary)

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Abstract:

The Mátra Mts has been one of the most frequented tourist destinations since the second half of the 19th century. This area – the highest mountain range in Hungary – offers a wide variety of free-time activities, geographical and cultural values. Because of these attractions, the tourism importance of the Mátra Mts has been recognised relatively early. The first tourist association was established in 1877 by Kolos Hanák and István Széky. They published the 'Mátra Guide' in the same year and reissued it in 1897 with minor revisions. This publication presents the natural-cultural values and the tourism infrastructure of the surrounding area. They also describe interesting hiking routes all around the Mátra. Although the most important sights were illustrated, no cartographic representation was published. In this study we processed the content of the book: every localizable site and tourism facility were visualised applying GIS techniques. A base map of relief, watercourses, road network and settlements were edited using the 2nd military survey topographic maps of Habsburg Empire (to present former conditions), the 1933 'Mátra' hiking map and hillshading (generated from SRTM). The digitized tourism elements from the book were visualised on this 'historical hiking map' using Leaflet. As the final online map is available to everybody, the early condition and infrastructure of tourism can be easily examined. This work contributes to the visual heritage preservation of the Mátra Mts: it may strengthen the knowledge on tourism history and digital cartographic solutions.

Keywords: hiking guide, cartoheritage, tourist maps, Kolos Hanák, Mátra

1. Introduction

In Hungary, the Mátra Mts is one of the most frequented tourist attractions. For those, who are interested in active recreation, this region has been one of the best places in the country. Geological formations of the volcanic mountains make the place even more special for hikers: climbing on and over rocky ridges and steep valleys can be challenging (Kovács & Horváth 2017).

Besides the adventures offered by the natural environment, the surroundings of the Mátra presents a great variety of cultural values too. People usually prefer places where cultural facilities and programmes are also present in addition to the diversity of nature. As a result, the Mátra has been visited by many tourists due to the abundance of leisure activities for decades. Over the last hundred years, the region has undergone a booming tourism development. This continues until today, which is the subject of several other studies (e.g., Benkő et al. 2019).

In the early 19th century, the local people of the Mátra Mts has started to discover the tourism potential of their homeland. After 1877, Kolos Hanák started his promotional and 'explorational' work in the area and published a tourist guide about the mountains. In this book, he wrote about the natural diversity, for example, post-volcanic activities, spas, unique parts of the mountains, natural wildlife, and cultural values, ethnic groups, castles (ruins), wine culture, and other geographical factors.

The guide's main body contains a great number of tour guides with detailed itineraries and descriptions. Hanák wrote about the routes hiking routes in detail: he led the hiker through the mountains presenting every attraction on the way.

The first tourist map of the Mátra Mts was edited in the early 20th century. Until then only guides were issued, such as the one we processed in this study (Hanák 1897). In this study, we present the processing of this guide and the workflow of reconstructing a hiking map in GIS software (QGIS) – based on the data published by Hanák. For this purpose, we used topographic and hiking maps from that era for topographic base data. This paper and the idea of depicting the tourism life cartographically may help to visualise the tourism situation in the early 19th century. Furthermore, can be the basis of other research or present new solutions in editing traditional maps in a GIS environment.

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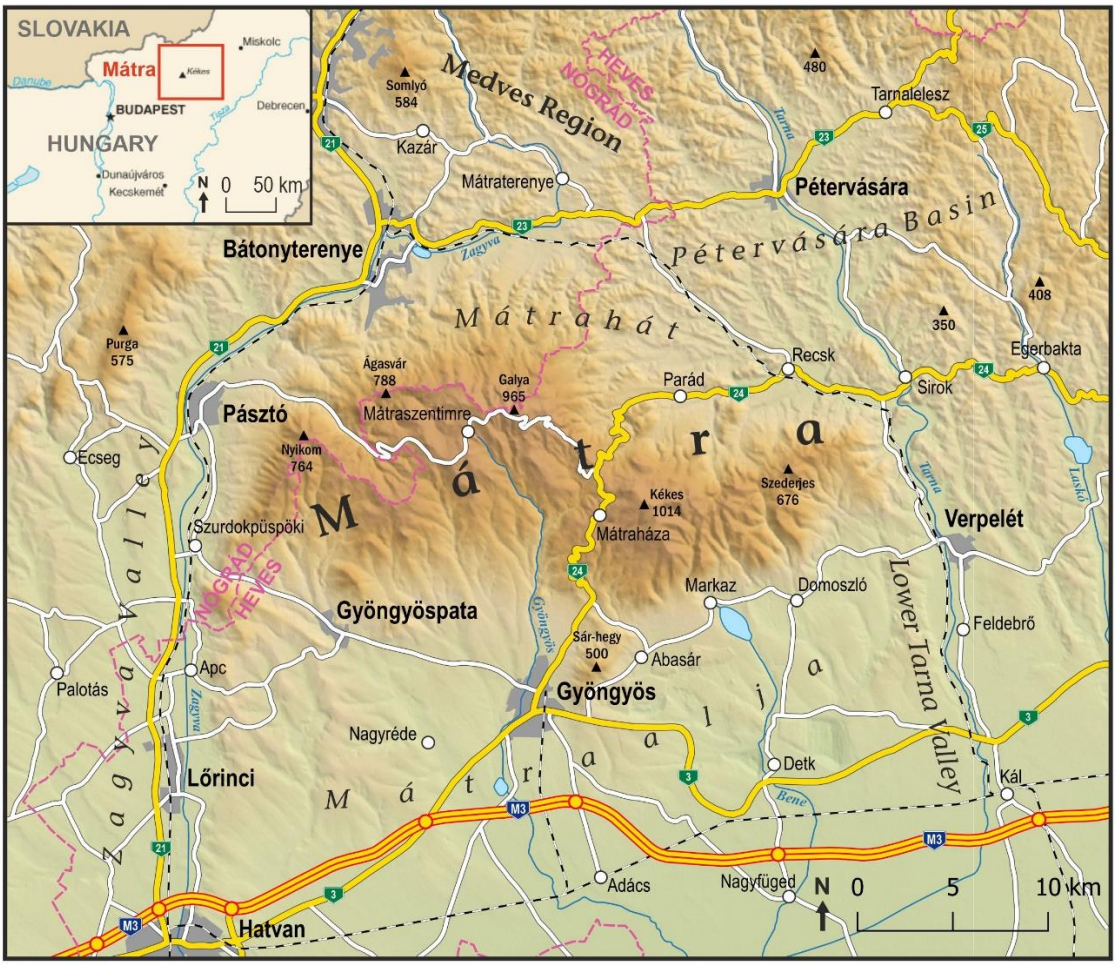

Figure 1. Map of the surroundings of the Mátra Mts

2. The Mátra Mts

The Mátra Mts is the highest part of the North Hungarian Range, between the rivers Zagyva and Tarna (*Fig. 1*). The three highest mountain peaks are here: Kékes (1014 m), Hidas-bérc (971 m) and Galya-tető (964 m). The northern part of the mountain is covered with debris, cliffs, rock blocks and cones. In contrast to this, there are flatter slopes with gentle creek valleys on the southern side (Papp-Váry 2002).

The Mátra Mts is a volcanic mountain range in the inner belt of the Carpathian Mountains. The main part of the mountain is composed of Miocene pyroxene andesite. In the Pannonian period, sediments with significant thickness accumulated mainly in the southern foreland of the Mátra (Dávid 2011).

Therefore, there are several occurrences of post-volcanic activity, for example, the sulfuric-carbonated springs and fumaroles around Parád, Recsk and Mátraderecske (Papp-Váry 2002).

Due to the special geographical setting and topography of the mountains, the climate differs from the national trends, and there are also differences between the northern and southern slopes. The climate in the mountains is temperate with mountainous properties. In the Mátralába, the northern part, the annual average temperature is 8°C with 600-700 mm of precipitation. The Mátraalja (southern part) has 9-10°C annual average temperature and 550-700 mm of precipitation (Karátson 1997).

The Mátra Mts is superabundant of springs and watercourses. There are about 360 springs – but the water flow of creeks highly depends on the amount of rainfall. There are just a few lakes in the mountains – but in the surroundings, many reservoirs were built to store rainwater (Papp-Váry 2002).

The agriculture is mostly concentrated on the southern sides, where we find large vineyards. The Mátraalja is the area of the Mátra Wine Region, which is famous for its wines all around Hungary (Papp-Váry 2002).

As the Mátra is of volcanic origin, mining of building stones and ores was widespread until the near past. Metallic and non-metallic minerals (e.g., copper and gold) were also mined: one of the largest mines was in Recsk, but by now all of them have been closed (Papp-Váry 2002).

There are several ethnographic groups in this region, who have lived next to each other for a long time. One of these is the ‘palóc’. This group has a special dialect, building style, traditional costume, and custom kitchen (Kovács & Horváth 2017).

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3. The history of hiking in the Mátra Mts

3.1 The history of tourism in the area

The Mátra Mts was one of the most visited mountains in Hungary in the late 19th century. The tourism potential of the area was by Kolos Hanák and his colleagues. In 1887 he founded the Hungarian Carpathian Association's Mátra Department, which handled the tourism infrastructure of the region and promoted the tourist opportunities of Mátrafüred and its surroundings.

After the 1890s, the potential in medicinal waters has been recognised. The medicinal waters of Parád and Gyöngyös were the most famous, which is why both settlements rapidly started to develop. The number of accommodation opportunities has increased, and the overall infrastructural development has also begun. Due to the post-volcanic activities, the 'csevice' springs of Recsk and Szajla also became well-known. In addition to the spa hotels, other accommodation facilities were built, such as the military resort.

Wine culture also became more and more widespread in the southern slopes (Mátraalja), offering a wider and wider variety of gastro tourism opportunities. The whole area of the Mátra Mts started to get in the focus of Hungarian and even international tourists throughout the year. Hiking and cultural tourism were popular in warmer seasons, while the winter sports facilities in Kékes and Galya-tető provided active recreation for the cold months too (Kovács & Horváth 2017, Benő et al. 2019).

3.2 The first tourist guides in Hungary

The first tourist maps (or 'representations') and guides were usually connected to the mountainous areas of the country. The beginnings of tourist life and hiking activity can be traced in the Tatra Mts since 1565. Descriptions about mountaineering and group hikes were issued later from the surroundings of Mt. Slavkovský (Nagyszalóki-csúcs, 2452 m), Mt. Lomnický (Lomnici-csúcs, 2463 m) and the city of Kežmarok (Késmárk). The first visual representation was also printed in Kežmarok: it is a 'sight map' of the peaks of the Tatra Mts viewed from Veľký Slavkov (Nagyszalók) in 1717. Mátyás Bél (in 1723), Jónás Czirbesz (in 1774) and Jakab Buchholtz (in 1783) issued detailed descriptions of various parts of the Tátra Mts (Jellinek 1939).

The first so-called tourist guides and maps were issued in the first half of the 19th century about the same area by Albert Sydow (in 1830), Károly Lohmeyer (in 1842) and Frigyes Fuchs (in 1863). The international importance of their works attracted many tourists not just from Hungary but from abroad too. Because of the large audience, infrastructural developments also took place: e.g., the first shelter (Rainer Shelter) built in Hungary (in 1865) can be observed until today. The other parts of the country (Transylvania and the central mountains – even the Mátra) were rather undiscovered until the middle of the 19th century (Jellinek 1939).

The mountains around Budapest became an important tourist destination due to their vicinity to the capital. The first publications were brief geographical descriptions here too (Schams 1822, Róthkrepf, 1833). The first complete Hungarian tourist guide was issued in 1845 (Feldmann 1845). These Feldmann guides were reissued several times (Faragó 1994). Many journal articles dealt with sights around the city, but until the end of the 19th century, only a few citizens of the capital started to discover the natural variety of their surroundings (Jellinek 1939).

Initially, the Mátra Mts was known for its geology and precious metals (Cotta 1866, Szabó 1869). The discovery of the area's tourism potential is tightly connected to Kolos Hanák, a lawyer living directly under the feet of the mountains in Gyöngyös. Since the 1870s he was a prominent figure of the city – not just in legal but tourism issues and various organisations too. He directed the building works of the first shelters, lookout towers and hiking trails in the Mátra. The foundation of the Hungarian Carpathian Association's Mátra Department is connected also to him and István Széky. He published the first tourist guide booklet of the area in 1887 that was reissued with moderate modifications and supplements in 1897 (Misóczki 1994).

3.3 The tourist guide of Kolos Hanák (1887 and 1897)

This booklet was the first published tourist guide about the Mátra Mts. It is built up by some distinct units. The first gives general information about the Mátra region: the extent, main attractions and geography. In the next unit, natural formations and the history of the mountain's surroundings are described (e.g., concerning Bene Castle and Ágasvár). Furthermore, Hanák writes about the ethnographic groups, who live in the region. The most interesting is the palóc group, whose language was considered unusual at that time. In the SE and western-central part of the Mátra "tót" people – with Slovakian roots – lived: their settlements were for example Fiskalitás, Ötház, Markaz, Domoszló and Nána.

The guide describes the spas of the region in detail. For example, there is an aluminous spa in Parád and Gyöngyös, that treats many sicknesses. An important infrastructural development was the building of the road between these two settlements: it connected the northern and southern part of the Mátra offering a much shorter way.

The second part of the book is the guide itself. Several tour proposals are described in this section. Hanák describes the possibilities to get to Mátrafüred from Budapest in the first step. The first proposal starts from Bene (Mátrafüred). The description is detailed, it presents every attraction on the trail. It indicates the average journey time between each point without resting time and gives the distance in meters. Furthermore, it gives a short description of the stops and other places, which are worth visiting. Besides the descriptions, the guide mentions hiking trail signs, where these are present.

In the guide, there are several photos of important and well-known attractions about some places at the end of the tour descriptions.

The third part of the book is a database. It contains almost all geographical names presented in the guide, and even more. There are settlements, mountains name, and several peak names too. Next to these place names, their administrative unit (practically the settlement) is noted. Additionally, every place described in this database are supplemented with elevation data – the elevation was measured from the level of the Adriatic Sea.

4. Mapmaking

In the initial decades of the Mátra's tourism, the publications and hiking guides of Kolos Hankák helped the visitors to find sights in the area. At the end of the 19th century, the first classic hiking maps were issued about the Tátra Mts and the Pilis. However, the 'Mátra Guide' (Hanák 1897) did not contain any supplementary maps, just a few photos of the most important attractions. Some draft maps, photos and drawings were put in a more detailed guide issued by Hanák et al. (1909), but the first hiking map of the Mátra was published in 1929 by a journal (Vigyázó & Horn 1929). Shortly before the Royal Hungarian State Mapping Institute started to issue the popular 'Hiker's maps' or 'maps with the angels' series – the Mátra map was published in 1933. Since that time, the area enjoys vivid tourist life with frequently-issued maps and guides.

The concept of our 'historic hiking map' is to present the geographical and tourism situation of the Mátra Mts at the end of the 19th century – as no tourist map representations were issued at that time. We decided to digitally reproduce and apply a map key and styles similar to the 3rd Military Survey and the 'Hiker's maps' series to make an age-appropriate but also well-legible cartographic representation.

4.1 Base materials

Various data sources (or their combination) were used to produce every distinct map layer. The most important layer categories are the relief, the coverage (polygon features), line drawings (e.g., road network, watercourses), symbol layers and the toponyms.

The 30 m NASA SRTM DEMs were used to produce background shaded relief. We have generated smoothed contour lines with an interval of 10 m. Gullies, ravines, cliffs and other relief elements were added from the 1933 hiking map. Additionally, the styling of the contour lines is taken from this hiking map: the contours on the military survey sheets are not measurable. However, we had to correct the relief especially in the surroundings of large mines and quarries that did not exist at that time.

The digitized and georeferenced 1:75 000-scale sheets of the Habsburg 3rd Military Survey (Biszak et al. 2007) were used to draw watercourses, settlement polygons, and the road network. The digitized map key book gave us the opportunity to reproduce most of the point and line symbols that we put on our map later.

The Mátra map of the 'Hiker's maps' series from 1933 was the main base of the corrections of the relief, watercourses and elevation data (for point feature labels). As it is more detailed and contains more tourism data than the 1:75 000 topographic sheets, natural point features (e.g., wells and springs) were mainly recorded from it. It was also the basis of the natural coverage layer as no earlier larger-scale data source was available. We could correct outdated map features based on this map after checking their validity: e.g., the railroad between Kisterenye and Kál-Kápolna was finished in 1887, but it was not on every used military topographic sheet.

The set of toponyms is the combination of data from the military maps and the 1933 hiking map. This is due to the investigation of their validity: the geographical names had to be appropriate for the 1890s.

4.2 The editing process

The first steps were the collecting of geographical names from the guide and reconstructing a map key (*Fig. 2*) based on the two cartographic base materials.

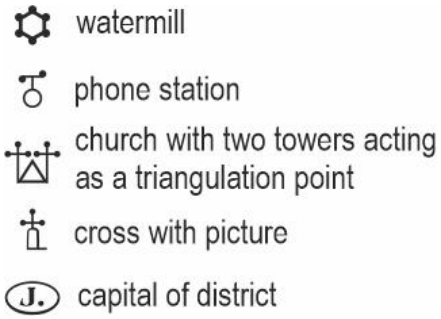

Figure 2. An excerpt of the map key presenting a few interesting point feature elements that occur on the base maps

The mapmaking process took place in QGIS in order to ensure later GIS compatibility for each map layer. We designated the scale of 1:50 000 as this is the scale of the 1933 map too, and it is suitable for the density of geographical and tourism information is.

The base of the shaded relief was the SRTM data. The contour lines were also automatically generated from the SRTM with 10 m intervals. These lines were manually corrected and other topographic features (e.g., gullies, cliffs) were added. Specific attributions were assigned for styling: the elevation or the type of the topographic feature.

The digitization of line symbols followed the content of the military survey maps. Sometimes the scanning quality did not make it possible to take over the data properly – in this case, the georeferenced 1933 map or the OpenStreetMap (just in the case of watercourses) were used. We assigned specific attributions here too to distinct line categories for easy styling. In the case of watercourses, we also wrote in their names in a separate field for labelling.

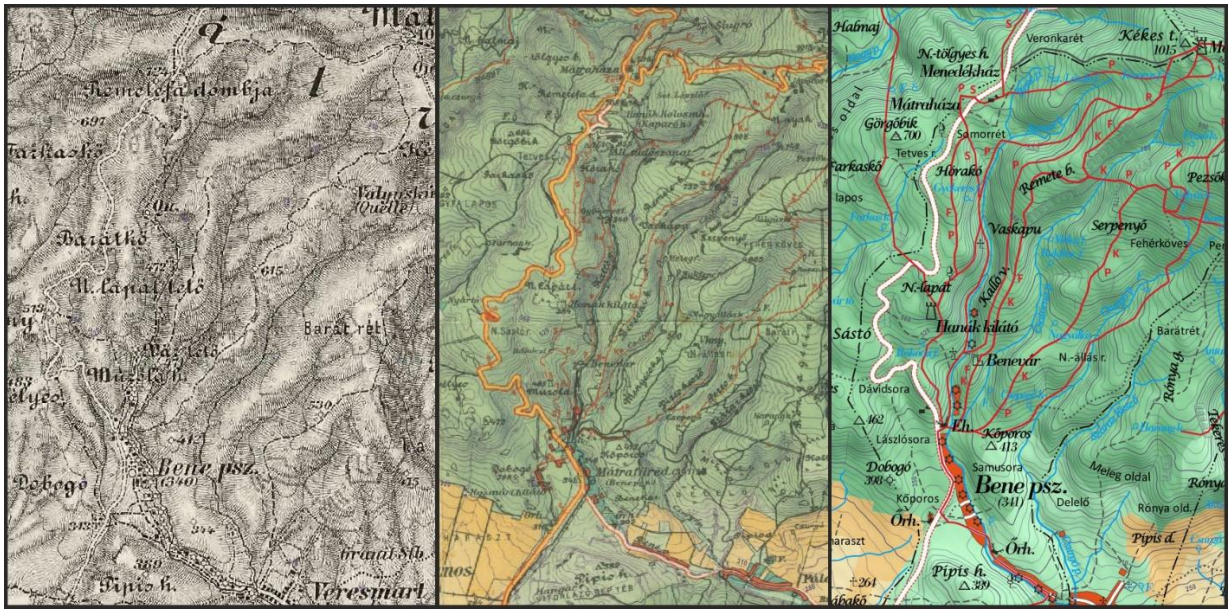

Figure 3. Comparison of the three maps- From left to right: the military survey sheet, the 1933 map and our reconstructed map containing the tourism features described by Hanák

We used polygons for digitizing surfaces and land cover. This was mainly based on the 1933 map. We distinguished forests, arable lands, meadows, and vineyards. The differences between the georeferenced maps and the OpenStreetMap were up to 50 meters, so we had to draw the polygons its offset. Watercourses helped us during this task as they significantly mark the bottom of the valleys: we compared the boundaries of the surfaces to them.

However, settlement polygons, lakes, and marshes were digitized using the corresponding 3rd military survey sheet instead of the 1933 map to be as correct in time as possible.

Point features were also recorded following the guidelines above (using specific fields for rule-based styling and labelling). These signs were recorded from both the military sheets and the 1933 map after validity checking where possible. E.g.: many of the steam mills in the 1933 map did not exist in the 1890s, but there were definitely more than in the military maps. The situation is vice versa in the case of watermills. We tried to put as many features as possible on the map using these maps as data sources – but the content of the 'Mátra Guide' book was also additionally implemented: many point elements were located and recorded from this publication.

Finally, we drew the hiking trail system. For this, we used the description from the guide. Fortunately, this base material was very detailed, and we could digitize each trail easily between the points described by the guide. Most hiking routes started from Bene (Mátrafüred), but there are many around Galyatető and Kékes. Some of the trails have signs, for example blue, red, or white, but most of them were unmarked at that time. We assigned a colour attribute in accordance with the book's text.

Most layer styles were also defined using QGIS. The only exceptions are the point feature signs of the military survey: these were re-drawn in a graphic software, saved as an SVG file and then added to the QGIS style file. The sizes of line symbols (contour lines, road network, watercourses, borders) were adjusted to the 1933 map symbol widths. Every line (except for the borders) was smoothed using the Geometry Generator of QGIS: the line features became nicely curved after this step.

An interesting process was the styling of geographical names. There are just a few font families and sets that use similar characters (mainly calligraphic ones) to the military maps and the 1933 hiking map, but they usually do not include special Hungarian letters. In the case of these, we drew these characters and applied the fonts for labelling.

The last step of the map editing was the preparation of the legend and the colophon. The print layout tool of QGIS was used for this. In *Fig 3.* the two base maps (the military sheet and the 1933 hiking map) are compared to the reconstructed map containing the tourism features described by Hanák.

5. Online interactive webpage

To publish the edited map that is based on the Kolos Hanák tourists guide, we used a Leaflet-based webpage. Leaflet is an open-source JavaScript library that handles GIS data in a web environment. Its well-constructed manual and a large amount of online-shared user experience and solutions make it easy to use (Leaflet 2021).

In the webpage, the main element is the reconstructed hiking map. The hiking trail system is a separate layer on the map: It is clickable with all the point features described by Hanák. Besides the map, information on the base materials, the guide and the editing process can be read. The webpage is available at: http://mercator.elte.hu/~edina/hanak/.

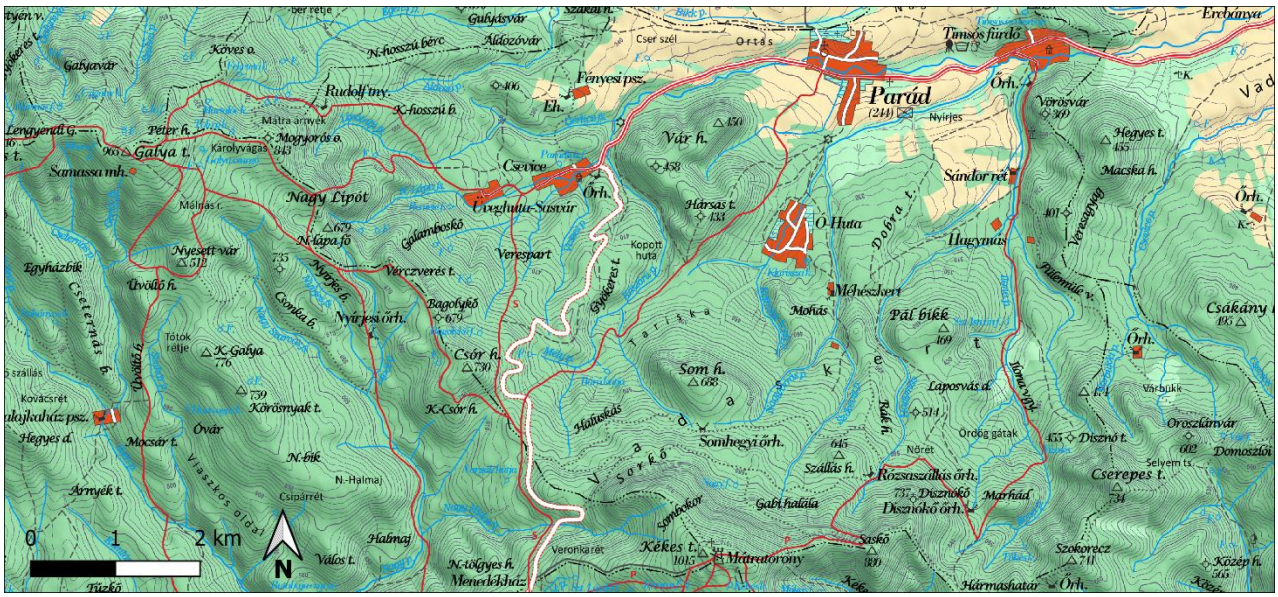

Figure 4. An excerpt of the edited map containing three important tourist destinations of the Mátra: Parád, Kékes and Galya. These are well-known places among tourists until today.

6. Conclusion

The main aim of this paper was to reconstruct the 'Mátra Guide' of Kolos Hanák as a cartographic product. We have designated two base materials for the main elements of the map: the corresponding 3rd military survey sheets and the 1933 hiking map of the Mátra (from the series of the "maps with the angels"). After producing the contour lines (using and modifying SRTM data), map key elements and font types were also reconstructed to make an age-appropriate cartographic product (*Fig. 4*).

The resulting map is unique:

- It presents the state of tourism at the end of the 19th century when no tourist maps were available in the Mátra.
- It was edited in a GIS environment that is rare even nowadays in the case of tourist maps.
- This map is a synthesis of nearly historic base data: the editing required thorough attention and additional research work to draw elements that existed at the time of the issued guide.
- The map is also published on the Internet.

This work contributed to the preservation of the tourism heritage of the Mátra Mts. It has an also important cartographic heritage aspect by the digitization of the base materials' content.

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