The Carpathian Basin: Denomination and Delineation

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ABSTRACT

The Carpathian Basin introduced in the geographical literature of the year 1921. However, after few clarifications it became in official use in 1947. It has been used in the context of landscape unit or physico-geographical entity mainly by the Central European geoscientists.

The Carpathian Basin bordered by the Alps, the Carpathians, the Dinaric Mountains and Šumadija Mountains. It represents the lowlands (and mountains which they encircled) as well as the slopes of mountains which faced to the lowlands.

After numerous multidisciplinary analysis (surface geology and roughness, orography, slope angles) the area of the Carpathian Basin delineated and presented. The analysis shown that the Carpathian Basin excludes the intramontane basins in the Carpathians and the Dinaric Mountains.

Keywords: Carpathian Basin, landscape; physico-geographical unit, Central Europe, geomorphologic subdivision.

I. INTRODUCTION

The geographical name Carpathian Basin for the landscape unit or the physico-geographical unit has been often used by Central European geoscientists. It exists also some uncertainties of its context when we use this geographical name and its delineation.

“The problem how to call the area bordered by the Alps, the Carpathians, the Dinaric Mountains in cartography and geography was not merely an issue of terminology. Different names were in use for this territorial unit both in different periods and simultaneously. (Hungarian Basin, Pannonian Basin, Central Danubian Basin, Danubian Basin, Carpath Basin, Carpathian Basin etc.). The names were reflecting some kind of spatial community sense, a general responsibility and attitude as well. This is the reason why both in international and Hungarian geographic science the notion and synthesis category of ‘Carpathian Basin’ was introduced with great difficulty only. The Hungarian naming process was also influenced by German, Italian, Russian, English and French spatial orientations and naming practices” [1].

The aim of this paper is to give an overview of the denomination history of the Carpathian Basin and to make a clear delineation of its boundaries to use in the proper context and without difficulties. As it is a regional Central European agenda the authors motivation was to do this study.

II. MATERIAL AND METHODS

Regarding the denomination of the Carpathian Basin the references used which dealing the history of research in geosciences, mainly physical and regional geography because the Carpathian Basin represents a landscape or physico-geographic units or sedimentary basin. The main references were published from Hungarian authors, the studies of Fodor [2], Hajdú [1] [3], Hevesi [4] [5], Mendöl & Bulla [6], Dövényi, [7] and Kocsis [8] were the guiding thread including the papers dealing with the Carpathian Basin issue.

According to the published the authors only in the Bátky & Kogutowicz [14] found the eastern delineation of the Carpathian Basin (Fig. 1). The delineation in this study based on several surficial analysis. The relief of the Carpathian Basin encompass the lowlands (and mountains which they encircle) and the mountain slopes faced to the lowlands. The location of the Carpathian Basin can be defined as the wider area of the Danube valley from the Devín Gate (or Hainburger Gate) till the Iron Gate. The regional geological maps were used to identify lower parts of the Carpathian Basin (e.g., Beck-Mannagetta & Medwenitsch, [9]) which shows the surficial geology, according to the lithostratigraphy of the Neogene and Quaternary sediments in the lowlands. The mentioned area of lowlands was encircled with the Eastern Alps (in the west) Carpathians (in north and east) and Dinaric Mts. and Šumadija Mts. (in the south). The mountain ridges which encircled the lowlands of the Carpathian Basin represent the borderline line for the Carpathian Basin. The analyzed area DEM-s of 30 m resolution was used from the Earth Explorer DEM collection of the United States Geological Survey (https://earthexplorer.usgs.gov) which were merged using QGIS software. The pixel resolution used in our case was 100×100 m. The number of the merged DEM-s was 148. “It considered as the relative relief (or relief energy) which quantifies the vertical differences of the terrain. Relative relief is defined as the elevation difference between the highest and the lowest points within an arbitrary cirlcular
environment identified” [10]. For the purpose of this investigation the study of Gábris et al., [10] consulted and the results shown for the Carpathian-Pannonian Region in the map of Telbisz (green colored area of the Map 6 in Gábris et al. [10]). The lowland faced slopes were identified on DEMs in some cases the orographic layers were used to distinguish and easier identify some ridges. In some cases, the map slope categories of Telbisz (Map 5 in Gábris et al., [10]) consulted which using slightly different parameters. The mountain ridges and the line which connected was drawing manually and when it was finished, we got the encircled area of the Carpathian Basin.

III. RESULTS

A. Denomination History of the Carpathian Basin

The Z. Hajdú wrote an article chapter entitled “The Carpathian Basin issue in the Hungarian geographical science” [1] which more-less covers the denomination history of the Carpathian Basin.

“The notion of ‘Carpathian Basin’ is a result of a long evolution process both in the history of international and Hungarian geographic science. The ‘sensing’ of the Carpathians and river Danube appeared in a natural way at an early time in the European geographical mind (Hungary’s territory was almost always covered by comprehensive European geographic analyses, and since the 18th century several cartographers were carrying out country assessments) and at the same time in Hungarian name catasters the rather the country’s ‘valley’ than basin features were emphasized for a long time. This ‘valley approach’ mostly resulted from the Danube’s natural geographical role and predominance in Hungarian geographical mind. This general ‘valley-oriented approach’ may be the explanation for the fact that both international and Hungarian maps showed the territory of Hungary stretched in Northwest-Southeast bound direction” [1].

“The language of Hungarian geographical literature was dominated by Latin (till 1844) at first and by German at a later period (officially till 1869, but informally till 1918). The ‘adaptation’ of spatial categories into different languages made continuously a big headache for geographers. (György Szaller wrote his book first in German in 1796 and later on the translated it into Hungarian. The two variations of the book significantly differ from each other in the use of names, spatial approach, spatial categories etc. It is an eye-catching phenomenon that in natural geographical studies the author used the German, while during the overview of political structures he used the Hungarian spatial approach.)” [1].

“The fact that Hungary belongs to the Danube water catchment area (Danube Valley) was recognized by the Hungarian geographical science at a relatively early period (Fig. 1). In the German Danube and spatial approach, the territory of Hungary was represented as a part of the Central Danubian Basin” [1].

“The Austrian historical and political approach often referred to the Habsburg Empire and later to the Austro-Hungarian Monarchy from 1867 as „Danube Monarchy” [1].

“During the 19th and 20th centuries after the “inside members of the Carpathian Basin” (Germans, Hungarians, Slovaks, Romanians, Serbs etc.) the “external nations” (English, French, Russians, Italians etc.) also formed their opinion on the naming of the geographic space during the marking and naming of geographic territories in the natural geographical division of Europe. We can see here a special ‘naming competition’ which cannot be considered as a unique or peculiar phenomenon through the area in wider sense” [1].
“In the second half of the 19th century the notion ‘Central Danube Basin’ was acknowledged in hydrological research only; the country’s geographical macro region was rather referred to as ‘Hungarian Basin’. In archaeology and history, the notion ‘Pannon Basin’ (or ‘Pannonian Basin’) was also in use. The name of ‘Carpathian Basin’ was used by foreigners only (non-Hungarian literature e.g., German) [1].

“After the turn of the 19th and 20th centuries the majority of Hungarian geographical papers, textbooks and maps labelled the area as ‘Hungarian Basin’. Between World War I and II both scientific literature and education textbooks used mostly the notion of ‘Hungarian Basin’, but the terms ‘Carpath or Carpathian Basin’ were also present in the wider public” [1].

One of the first use in the scientific literature the Carpathian Basin as a geographical term was that from the prominent cartographer Kogutowicz (Bátky & Kogutowicz, [14]) for the title of the map of the “Relief and hydrography of the Carpathian Basin” (Domborzat és vizek a Kárpátok medencéjében). However, he used the slightly different term in Hungarian (Kárpátok medencéje not Kárpát-medence) (Fig. 2). Later in the monograph text it was implemented Bendefy-Benda [11] [12], when published the results of the geologic investigations.

“Béla Bulla in 1940 clearly pointed out that geographical names were not merely names, but they represented ideas as well: ‘Foreign literature tends to hide the original right of Magyars for this area by naming it Danube Basin instead of Hungarian Basin – though its geographic unity should be regarded as evidence.’ [13]” [1].

“In 1941 a scientific journal was founded under the title “Kárpát-medence” (Carpathian Basin) regarding the popularization of the notion and the area’s scientific analysis its prime mission. The names such as the Carpathian Basin and the Hungarian Basin started to be synonyms in fact” [1].

The Carpathian Basin was represented as an orographic, hydrological area on the majority of maps. The orographic and hydrological elements were the very parts of natural geography through which were the most suitable elements for the demonstration and verification of the theory of Carpathian Basin as a whole natural unit (Fig. 2).

“The notion of Carpathian Basin was ‘introduced’ by the monograph of Bulla & Mendől [6] as a geographical name in Hungary with almost an exclusive character. The “Carpathian Basin is the smallest physical geographic unit that fully covers the territory of Hungary with its neighbor states” [6] – this was the authors’ explanation why it has to be replaced the ‘Hungarian Basin’ term with the ‘Carpathian Basin’ (sensu Hajdú, [1]).

The Carpathian Basin was in wider use as a landscape unit, regional unit in physical geography and as a sedimentary basin in Central Europe. In all mentioned contexts it encompasses the same area.
Fig. 3. The area of the Carpathian Basin.

Fig. 4. The area of Hungary, the Carpathian Basin (s.l.) and Pannonian Basin (cropped from [8]).
B. Delineation

The after applying the methods described in the Methodology part of the paper, we create the delineation line on hillshape DEM (Fig. 3) which in some cases better shown the mountain ridges. The final delineation of the Carpathian Basin shown on Fig. 4, with applied colors for topographic layering. The north boundary of the Carpathians are the ridges of slopes faced to the Little Alföld (in the Inner Northwestern Carpathians), Alföld (in the Inner Northwestern Carpathians and Inner Northeastern Carpathians) and the Transylvanian Lowland (in the Inner Northeastern Carpathians and Inner Eastern Carpathians). The eastern boundary are the ridges of the slopes faced the Transylvanian lowland (in the Inner Eastern Carpathians). The southern boundary were the ridges of slopes faced to the Sava Upper- and Sava Plain (sensu Gaudenji & Mihajlović [15]) (in the Dinaric Mountains and Šumadija Mountains), while south from Stig, Braničjevo, Banat Plain and Transylvanian Lowland are the ridges of north faced slopes to the lowlands of the South Carpathians (South Carpathians sensu Cvijić, [16], [17]).

IV. DISCUSSION

The use of geographical name Carpathian Basin mainly favored by geoscientists who investigate the area of Hungary. It is the smallest natural unit (landscape/physico-geographic entity) which encompass the whole area of Hungary. The investigation of Hungary’s neighboring countries used this term rare and with confusion they prefer some other term however they have different meanings (e.g., Pannonian Basin). The term Carpathian Basin is useful among archaeologists, geoscientists, ecologists, and biologists because it is strongly connected with a landscape / geographical unit.

According to the delineation the investigations has several challenges:

i) The intermontane basins. The intermontane basins are encircled by higher orography on all sides and drained by streams or rivers which leave the basin floor through relative narrow valley. The position of the intermontane basins is often influenced by the lithology and structural lines in the bedrock. The basin outlines tend to follow the mountain ridges faced to the lowland area between the Alps, Carpathians, Dinaric Mts. and Šumadija Mts. The first problematic case was the Zagorje Basin which has some restricted connections via river valleys to be open northwards and eastwards, so it was classified that cannot be a part of the Carpathian Basin. In the case of Krško- and Samobor basins (defined after Nikolić, [18]) and Kupa valley south of Vukoměřice Gorice as well as other small basins south of the Upper and Lower Sava Plain (described in Gaudenji & Mihajlović [15]) of the Dinaric Mountains qualified as intermontane basins outside the Carpathian Basin. Similar case we have in the the Gheoşheni-, Chiuca- and Bresov basin which is densely dissected by fluvial valleys in the Eastern Carpathians.

ii) The North Hungarian (Matra-Slanec) Range. Due the landscape subdivision the North Hungarian (Matra-Slanec) Range belongs to the Northwestern Carpathians [19]. We have the same case for the Apuseni Mts. and Poiana Ruscă Mts, which also belongs to the Carpathians.

iii) Respecting the earlier delineation. The earlier delineation concepts mainly based on the line which connects the highest ridges / watersheds of the mountain systems (e.g., Fig. 1). This methodology will include the intermontane basins and lower peak than the highest ridges, but Carpathian Basin used also in the context of sedimentary basin. In this study only the basin slopes faced to the lowlands included in the Carpathian Basin but the main ridges of mountains systems generally not.

The term Carpathian Basin and its synonyms issue. The term Carpathian Basin used in the context of synonymy of the Pannonian Basin, Pannonian Basin System, Pannonian Plain. Due its definition and area which encompass, the Carpathian Basin has no synonyms. The Pannonian Basin is a paleogeographic term defined by Róth von Telegd [20], [21] its area in the geographical context described as the Pannonian Realm. The Pannonian Plain represents the plain segments of the Pannonian Realm. The Pannonian Basin System is a tectono-genetic entity of Central European geology (e.g., Royden & Horváth, [22], [23]). In the wider geographical context terms such as Carpathian-Dinaric Region, Carpathian-Balkan Region, Carpathian-Balkan-Dinaric Region etc. are coined.

The recently published 2nd volume of the National Atlas of Hungary (Kocsis, [8]) have different delineation of the Carpathian Basin than in our study. It is similar (or same) as it was in the initial version or the first description of Bátky & Kogutowicz [14]. However, in the first description its N and E border are the same as in the atlas of Kocsis [8] (Fig. 4). The methodological explanation could be that in case of its N and E border. However, entire denomination was still in the use.

Both results and delineation of the Carpathian Basin can be a matter of debate to find a solution and compromise. According to the recent status we also can simply use the results of this study could as s.s. (Carpathian Basin sensu stricto) or while those in Kocsis [8] in s.l. versions (Carpathian Basin sensu lato) with citing the appropriate publication sources.

V. CONCLUSIONS

The geographical term/name Carpathian Basin as the landscape unit or the physico-geographical entity, very often has been used by Central European geoscientists. The Carpathian Basin introduced and in use in the geographical literature of the year 1921. However, after few clarifications it became in official used from 1947. The Carpathian Basin bordered by the Alps (in the west), the Carpathians (in the north, east and party on the south), the Dinaric Mountains and Šumadija Mountains (in the south). It represents the lowlands (and mountains which they encircled) as well as the slopes of neighboring mountains which faced to the lowlands. Based on its geology, slope categories and relative relief on DEM-s defined its position and delineation, which is given in the Fig. 3.

Due to the earlier delineation, it includes some intramontane basins (Carpathian Basin s.l.) or this study (Carpathian Basin s.s.) further investigations and finding the
solutions for this landscape unit(s) can be an objective of future investigations.

The Carpathian Basin has no synonyms and it’s a unique geographical name.

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**REFERENCES**


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