

Spatial Distribution of Ski Slopes in Romania

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Abstract: Mountain spaces are fragile areas characterized by great ecological vulnerability. They have come to the attention of human concerns lately due to the need for new spaces. In this context, knowledge of the spatial distribution of ski slopes represents a significant indicator that can provide us with information on the extent of mountain tourism focused on practicing winter sports. From a methodological point of view, the analysis of spatial distribution was carried out at four levels of action: development region, county, locality and ski slope. The results obtained gave us a succinct and concise image of the spatial dimension of winter sports in Romania. To deepen the results thus obtained, new studies and research are needed on several directions of action with interdisciplinary research teams, a fact imposed by the complexity and importance of mountain space in protecting and preserving the environment.

Keywords: ski slopes, spatial distribution, mountain tourism, winter sports

Introduction

Tourism is an economic and social phenomenon representative of the contemporary era (Herman et al., 2024a, b; Nedelcu, 2015), which encompasses all the motivations and activities of a recreational and recuperative nature carried out in a certain territory, at a given time (Cocean, 2007; Herman et al., 2023; Herman et al., 2024c). In terms of time, it dates to antiquity, being practiced mainly by the elites of those times in the form of the Olympic Games, pilgrimages and medical trips (Ciangă and Deszi, 2007; Muntele and Iașu, 2003). Today, tourism has become increasingly accessible to the masses of the population, amid the technical and technological advances recorded by human society, reflected in the modernization of infrastructure, and the duration of free time (Barros and Machado, 2010; Gondos and Nárai, 2019; Dickinson and Peeters, 2014; Sharpley, 2002; Tóth and Dávid, 2010).

In this article we will talk about mountain tourism, focused on practicing winter sports. The history of this category of tourism in Romania is relatively recent, namely

from the second half of the 19th century, when the first mountain tourist resorts were set up, Sinaia, Păltiniș and Semenic (Ciangă and Deszi, 2007). Over time, mountain tourism focused on practicing winter sports have experienced constant development in terms of quantity (number of ski slopes and related facilities, expansion of locations where new ski slopes have been set up in accordance with existing demand and needs) and quality (quality of existing slopes and facilities, existing services, etc.) (Ciangă and Răcășan, 2015; Gingulescu and Cocean, 2011; Herman et al., 2021).

Against this background, the development of tourism and its spatial expansion represent a defining constant of current societies characterized by economic, social and cultural prosperity. Within tourism, winter sports tourism plays an increasingly important role, requiring optimal orographic and climatic conditions, specific to mountain areas. In Romania, these can be found in an altitudinal range between 1500 – 1800 m, in the Eastern and Southern Carpathians, 1400 – 1600 m, in the Banat Mountains and between 1000 – 1600 m, in the Apuseni Mountains. This altitudinal differentiation, regarding the location of optimal conditions for the location of recreational ski slopes, is influenced by a series of factors, among which the dynamics of air masses and implicitly the precipitation regime are of major importance, both closely related to the latitude and longitude arrangement of the mountain ranges related to the Romanian Carpathians (Erdeli and Gheorghilaș, 2006; Ilieș, 2007).

Over time, mountain areas have been ideal spaces for practicing various forms of tourism focused on thermal tourism, climatism, mountain hiking, mountaineering, knowledge and more recently the practice of winter sports (alpine skiing, sledding, bobsleigh, etc.). The conquest and use of mountain spaces by tourism has been supported by the quality of the landscape and the access possibilities. The quality of the landscape is a motivational factor resulting from the multimillennial cooperation of natural and anthropogenic factors, while the access routes (road, railway, cable car) have facilitated the expansion of tourism in a space that is more difficult to access due to the morphometric characteristics, specific to the mountain space, which "is a special space, of great complexity and dynamism" (Cândea et al., 2006, p. 12).

The mountain space is defined by the existence of numerous resources with touristic valences, of orographic, hydrographic, climatic and biogeographic nature. The abundant existence of the typological categories of resources mentioned above has gradually led to the expansion of tourism in these mountain areas, bypassed until recently by man and his activities. Therefore, currently, the mountain space is a space of strong convergence and polarization of tourist flows, local, regional and global.

In this context, the purpose of this study is to obtain an image/radiography of the ski slopes in Romania. This is justified from the perspective of the weight and importance of tourism focused on winter sports, as well as the need for a scientific

allocation of the resources necessary for the consolidation and development of mountain tourist destinations.

Knowing the spatial distribution of ski slopes in Romania is an essential condition in the development of a tourism development strategy focused on winter sports, as a structural, integrated part of the tourism development strategy. The increasing importance of winter sports tourism from an economic, social and ecological perspective is a defining reality for Romanian and global society. Proof of this is the time allocated to ski holidays, as an expression of the adaptation of social needs to the local tourist offer.

In the specialized literature, the issue of ski slopes has been approached from various points of view, which focused on: the evaluation of ski potential (Gingulescu and Cocean, 2011a, b; Ilie, 2013; Popan, 2022), the efficiency of ski slopes (Cernaianu and Sobry, 2020; Bacoş and Gabor, 2021; Ilie et al., 2020; Yang and Wan, 2010; Teodor, 2016), the impact of ski slopes on the environment (Freppaz et al., 2013; Pintaldi et al., 2017), the characteristics of ski slopes (Lesenciuc et al., 2013; Voiculescu et al., 2011; Tofan and Păcurar, 2013), etc. However, the novelty of our study lies in the methodological approach to the analysis of the number, length and capacity of ski slopes in Romania at regional, county, locality and slope levels.

The research hypothesis assumed that ski slopes are unevenly distributed at a spatial level, with development regions, counties and localities that overlap a mountainous terrain being favored in this regard. Thus, through this research, we highlight the spatial distribution of ski slopes at the level of development regions, counties, localities and tourist regions focused on practicing winter sports in Romania.

Research methodology

Knowing the spatial distribution of ski slopes involved completing the following stages: identifying and collecting the information necessary to carry out the study (regarding number, length and capacity); systematizing, ranking and evaluating ski slopes according to the reference units targeted (development region, county, locality and slope); cartographic representation of ski slopes and analysis of the cartograms thus obtained.

The data necessary for the study were taken from the websites of the entities responsible for collecting and managing data on ski slopes in Romania (National Authority for Tourism; Tour - National Project of Tourist Information and Promotion; Ski in Romania; Tourist Romania Travel Agency), in the time interval January-February 2025, and the boundaries of the reference units in digital format (shapefile) were downloaded from ANCPI on March 21, 2025. The software used was Excel (for the primary analysis aimed at centralization, systematization and hierarchy) and ArcGIS PRO 3.4 (for the spatial rendering in cartographic form of the distribution of ski slopes in Romania).

Results and discussion

In Romania, in 2024, there were 229 ski slopes, with a length of 262,086.34 m, in an altitudinal range between 387 m (The Cozla 1, Cozla 2 Ski Slopes in Piatra Neamț, Neamț County) and 2,200 m (The Curba de Nivel-Pilon 2 Slope, Bâlea Lac, Sibiu County). The skiable area related to them was 1077.92 ha, with an optimal daily capacity of 188,983 skiers. Regarding the level of difficulty, there were 3 typological categories: easy slopes (88 units, 63,470.4 m, with an optimal daily capacity of 64,190 skiers), medium slopes (101 units, 136,750.74 m, with an optimal daily capacity of 88,163 skiers) and difficult slopes (40 units, 61,865.2 m, with an optimal daily capacity of 36,630 skiers).

The mobility of winter sports practitioners in Romania was facilitated by the existence of 208 cable transport installations with a length of 172,630.89 m and a capacity of 137,490 seats. The cable transport installations in Romania that served the ski area were represented by 6 cable cars (15,605 m long, capacity 3,470 seats), 11 gondolas (24,246 m long, capacity 16,500 seats), 39 chairlifts (46,145.34 m long, capacity 37,236 seats), 214 ski lifts (81,026.55 m long, capacity 72,408 seats) and 28 children's ski lifts (5,608 m long, capacity 7,876 seats).

To streamline tourist and sports activities, the ski slopes were equipped with 86 nighttime facilities and 127 artificial snowmaking facilities.

Table 1. Defining indicators

	Number	Length	Capacity
Ski slopes	229	262,086.34	188,983
Cableway installations	208	172,630.89	137,490
Nighttime installations	86	-	-
Artificial snow making facilities	127	-	-

Analysis of ski slopes at the level of development regions

Development regions are spatial entities that extend over the areas of several counties, created through their free association, having as their European equivalent in the nomenclature of territorial statistical units the NUTS II level (Sandu, 2011; Haller, 2017). They were established based on Law no. 151/1998 (on regional development in Romania) amended by Law no. 315/2004 (on regional development in Romania), in accordance with EC Regulation no. 1059/2003, on the establishment of a common system for the statistical classification of territorial units (Butnaru and Niță, 2016).

The importance of analyzing the ski area at the level of development regions is evident from the perspective of the place occupied by winter sports tourism at the regional level, from an economic, social and ecological point of view. The development and responsible management of the ski area most often requires a strategic regional

approach, given that its surface exceeds the boundaries of the county, as well as the necessary economic, human and technological capacities.

Having relatively large surfaces, the natural setting of the development regions is diversified, including plains, plateaus, hills and mountains. Out of the total of 8 development regions that are part of the structure of Romania, six regions have mountain units on their territory that have facilitated the practice of winter sports, given the demand for this sector.

The analysis of the distribution of ski slopes at the level of development regions highlighted the existence of oscillations in the hierarchy of reference units depending on each parameter analyzed (number, length, capacity and typology). However, the predominance of ski slopes can be observed in the Center, North-West and West regions, followed by the North-East, South and South-West (figure 1).

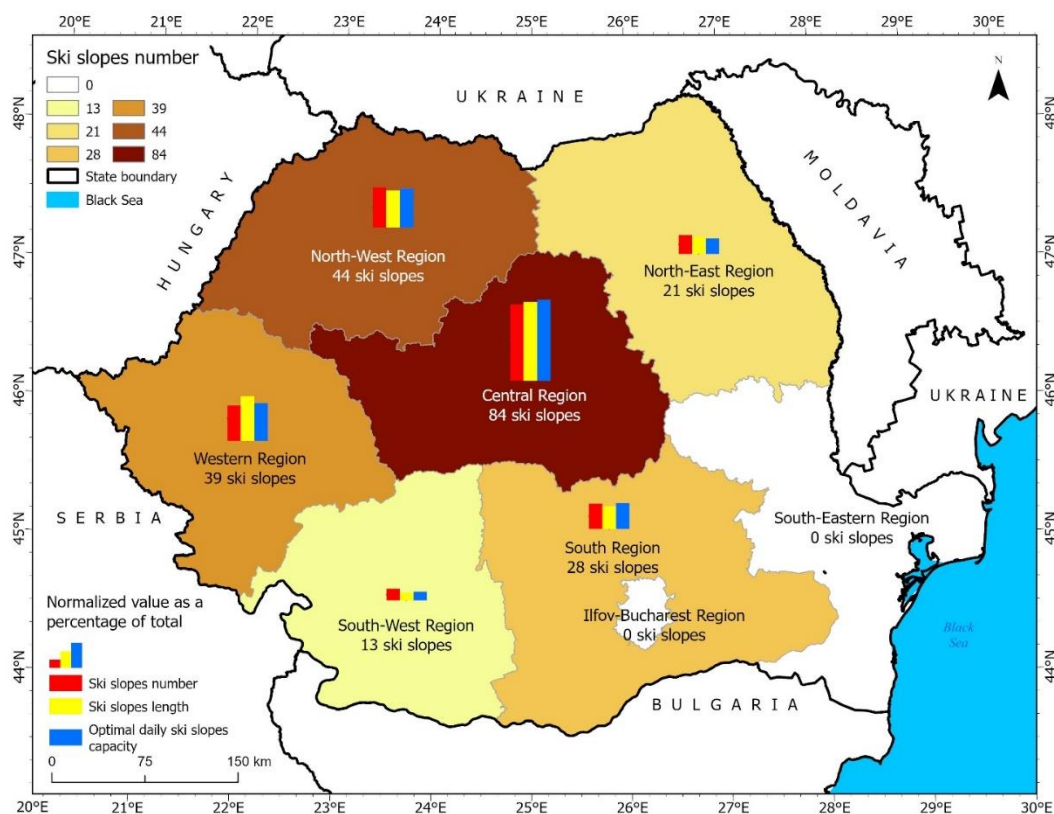


Figure 1. Distribution of ski slopes at the level of development regions

The analysis of the distribution of the number of ski slopes at the level of development regions indicates the existence of the following hierarchy: Center (84 units, 99,172.1 m long, 374.77 ha surface area and 73,680 persons optimal daily capacity), North-West (44 units, 46,379 m long, 160.96 ha surface area and 35,260

persons optimal daily capacity) and West (39 units, 56356.3 m long, 304.5 ha surface area and 34,160 persons optimal daily capacity), followed by the South regions (28 units, 28,660.54 m long, 121.4 ha surface area and 23,580 persons optimal daily capacity), North-East (21 units, 21,644.4 m long, 76.14 ha surface area and 14,263 persons optimal daily capacity), South-West (13 units, 9,874 m long, 40.15 ha surface area and 8,040 people optimal daily capacity). No ski slopes have been arranged in the Ilfov – Bucharest and South – East regions (figure 1).

The Central, North-West and West development regions concentrate 73% of the total number of ski slopes, respectively 77% of the length and 76% of the total capacity of ski slopes in Romania, being served by 91 (72%) artificial snowmaking facilities, 67 (78%) nighttime facilities and 161 (77%) cable car facilities, with a length of 39,687.89 (77%) m and a capacity of 38,040 (72%) people.

The Center Development Region, with an area of 34,100 km² and a population of 2,288,061 (12.0%) inhabitants (POP108D, 2025), overlaps the administrative-territorial boundaries of the counties of Alba, Brașov, Covasna, Harghita, Mureș and Sibiu, with a density of 67.1 inhabitants/km². From an orographic point of view, it is represented by the Carpathian Mountains (South-West of the Eastern Carpathians; North-East of the Southern Carpathians; South-East of the Apuseni Mountains) and the Transylvanian Depression (Southern part of the Transylvanian Depression). In the mountainous area of the Center Development Region, 84 ski slopes with a length of 99,172.1 m and a daily capacity of 73,680 skiers have been arranged. From a typological point of view, easy slopes dominate (38 units), followed by medium (34 units) and difficult (12 units). The cable transport facilities that serve them are represented by 54 ski lifts (31,352 m long, 32,606 seats capacity), 13 baby ski lifts (2,890 m long, 3,950 seats capacity), 8 chair lifts (8,310 m long, 8,358 seats capacity), 5 cable cars (1,770 m long, 14,216 seats capacity) and 2 gondola lifts (2,300 m long, 3,940 seats capacity).

The North-West Development Region, with an area of 34,159 km² and a population of 2,539,784 (13.3%) inhabitants (POP108D, 2025), overlaps the administrative-territorial boundaries of the counties of Satu-Mare, Maramureș, Bihor, Sălaj, Bistrița-Năsăud and Cluj, with a density of 74.4 inhabitants/km². From an orographic point of view, it is represented by the north-west of the Eastern Carpathians (Oaș Mountains - Igriș, Gutâi and Țibleș, Maramureș Mountains, Rodnei Mountains, Țibleș Mountains, Bărgăului Mountains), the north of the Apuseni Mountains (Pădurea Craiului Mountains, Plopiș, Meseș, Bihor Vlădeasa Mountains, Gilăului Mountains, the north of the Codru-Moma Mountains), the north-west of the Transylvanian Depression, the north of the Plain and the Western Hills. In the North-West Development Region, 44 ski slopes with a length of 46,379 m and a daily capacity of 35,260 skiers have been arranged. From a typological point of view, medium slopes

dominate (20 units), followed by easy (13 units) and difficult (11 units). The cable transport facilities that serve them are represented by 18 ski lifts (12,115 m long, 10,522 seats capacity), 12 chair lifts (16,152 m long, 11,353 seats capacity), 5 baby ski lifts (583 m long, 1,006 seats capacity), 1 gondola lift (2,600 m long, 1,800 seats capacity), located in Borșa, Maramureș County.

The West Development Region, with an area of 32,028 km² and a population of 1,672,978 (8.8%) inhabitants (POP108D, 2025), overlaps the administrative-territorial boundaries of Arad, Timiș, Hunedoara and Caraș-Severin counties, with a density of 52.2 inhabitants/km². From an orographic point of view, it is represented by the southwest of the Apuseni Mountains (south of the Codru-Moma Mountains, the Zarandului Mountains, the Metaliferi Mountains), the Poiana Ruscă Mountains, the Banat Mountains (Semenicului, Aninei, Locvei, Dognecei, Almajului Mountains) and the northwest part of the Southern Carpathians (Cernei Mountains, North of the Godeanu Mountains, Retezat Mountains, Tarcului Mountains, West of the Șureanu Mountains), the south of the Plain and the Western Hills. In the North-West Development Region, 39 ski slopes with a length of 56,356.3 m and a daily capacity of 34,160 skiers have been arranged. From a typological point of view, medium slopes dominate (18 units), followed by easy (11 units) and difficult (10 units). The cable transport facilities that serve them are represented by 30 ski lifts (22,383 m long, 16,827 seats capacity), 10 chair lifts (10,670 m long, 6,500 seats capacity), 2 gondola lifts (6,030 m long, 3,400 seats capacity) and 1 baby ski (400 m long, 360 seats capacity).

At the opposite pole was the South-West Development Region, where 13 ski slopes with a length of 9,874 m and a daily capacity of 8,040 skiers were arranged. From a typological point of view, easy slopes dominate (8 units), followed by medium (4 units) and difficult (1 unit). The cable transport facilities that serve them are represented by 6 ski lifts (3,715.55 m long, 4,552 seats capacity), 3 baby skis (585 m long, 670 seats capacity), 2 chair lifts (2,149 m long, 3,400 seats capacity) and 1 gondola (1,992 m long, 2,200 seats capacity), located in Voineasa, Vâlcea County. The South-West Development Region, with an area of 29,212 km² and a population of 1,855,697 (9.7%) inhabitants (POP108D, 2025), overlaps the administrative-territorial boundaries of the counties of Gorj, Vâlcea, Mehedinți, Dolj and Olt, with a density of 63.5 inhabitants/km². From an orographic point of view, it is represented by the southeastern part of the Southern Carpathians (Mehedinți Mountains, Vâlcanului Mountains, Parâng, Căpățâni, Lotrului and the southwestern part of the Făgăraș Mountains), the western plateau and the Getic Subcarpathians and the western Romanian Plain.

Analysis of ski slopes at county level

Counties are spatial realities that emerged following the administrative-territorial reforms of Romania in 1968, 1981 and 1997, so that currently the territory of Romania is divided into 42 counties (Law 2, 1968; Decree 15, 1981; Law 50, 1997). The analysis of ski slopes at county level revealed that the largest number of ski slopes was in Harghita County (28 ski slopes), Prahova (27 ski slopes), Brașov (25 ski slopes) and Maramureș (24 ski slopes), while the smallest number of ski slopes were in Argeș, Bacău and Satu Mare counties, each with one ski slope (figure 2). We note that 21 counties (50%) do not have such facilities, which is justified by the orographic conditions specific to plain and hill units.

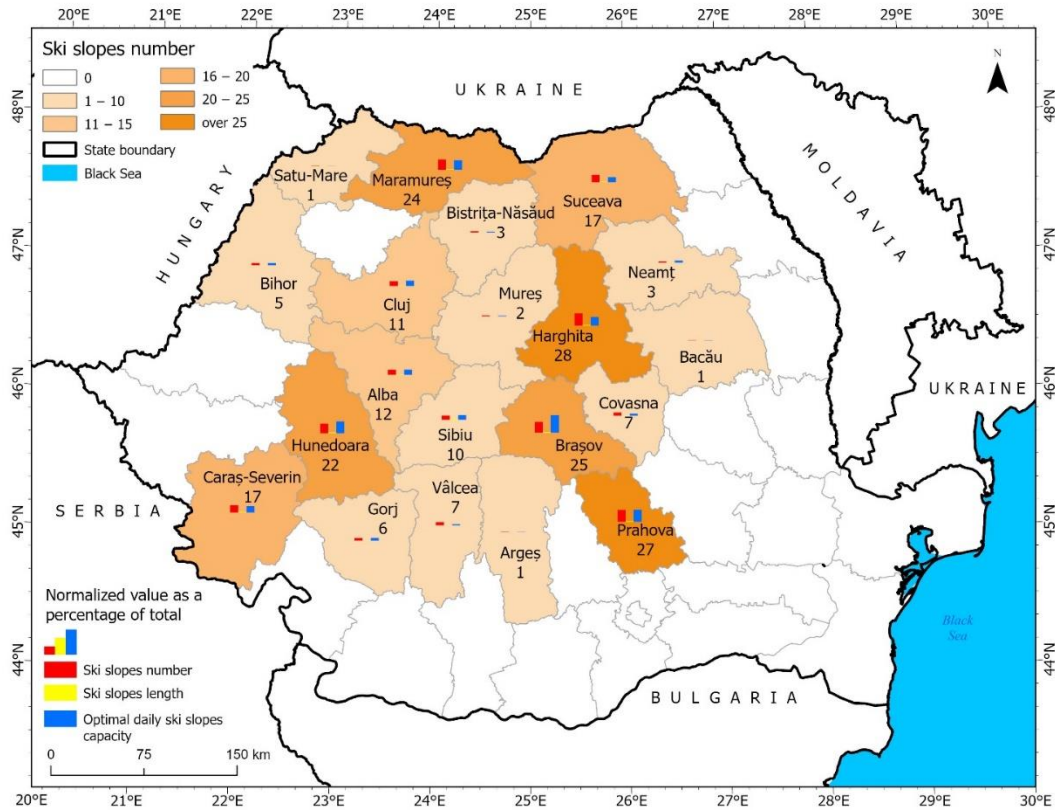


Figure 2. Distribution of the number of ski slopes at county level

Harghita County has the largest number of ski slopes (28 units), with a length of 18,913 m and an optimal daily capacity of 16,060 skiers. Located in the Ghurgiu, Giurgeului, Harghita, Ciuc and Ciomatu Mountains, the ski slopes are equipped with 29 cable transport facilities (16,180 m long with a capacity of 14,720 seats), 14 nighttime facilities and 16 artificial snowmaking facilities.

Prahova County ranked second in terms of the number of ski slopes (27 units), with a length of 28,110.54 m and an optimal daily capacity of 22,780 skiers. Located in the Bucegi and Bai Mountains, the ski slopes are equipped with 13 cable transport facilities (11,720 m long with a capacity of 11,890 seats), 5 nighttime facilities and 13 artificial snowmaking facilities.

In third place in terms of the number of ski slopes was Braşov County with 25 units, with a length of 29,120 m and an optimal daily capacity of 33,280 skiers. Located in the Bucegi, Piatra Craiului, Postăvaru and Făgăraş Mountains, the ski slopes are equipped with 28 cable transport facilities (26,380 m long with a capacity of 20,422 seats), 7 nighttime facilities and 17 artificial snowmaking facilities.

The three counties analyzed, although they represent only 7% of all counties, have 35% of all ski slopes in Romania, respectively 34% of all cable car facilities, 30% of lighting facilities and 36% of artificial snowmaking facilities, which highlights the role of these areas for practicing winter sports.

At the opposite end were the counties of Argeş, Bacău and Satu-Mare, where one ski slope was built in each county.

The analysis of the number of ski slopes, at county level, by typological categories, highlighted five categories of units: very large (2 counties, 51 ski slopes with a length of 47,023.54 m and an average daily capacity of 38,840 people), large (3 counties, 71 ski slopes with a length of 81,090.3 m and an average daily capacity of 73,850 people), medium (2 counties, 34 ski slopes with a length of 47,735.4 m and an average daily capacity of 21,613 people), small (2 counties, 23 ski slopes with a length of 24,665 m and an average daily capacity of 19,990 people) and very small (10 counties, 36 ski slopes with a length of 29,614.1 m and an average daily capacity of 25,380 people) (figure 2).

Analysis of ski slopes at locality level

The localities are areas of maximum population concentration, 72 of which are also destinations for practicing winter sports. There are 14,216 localities in Romania, of which 791 localities (6%) are urban, the rest are rural localities (ADM101A, 2025). Ski slopes were in 72 localities, from 20 counties.

The most ski slopes were in the localities of Sinaia (18 units), Straja (10 units) and Şureanu (10 units), while the fewest were in 28 localities (one ski slope in each).

The Sinaia tourist resort, located in Prahova County, Bucegi Mountains mountain unit, has 18 ski slopes (with a length of 19,092.54 m and an optimal daily capacity of 16,680), respectively 7 cable transport facilities (with a length of 7,430 m and a capacity of 8,040 seats), 1 night facility and 6 artificial snowmaking facilities.

The Straja tourist resort, located in Hunedoara County, the Vâlcan Mountains unit, has 12 ski slopes (with a length of 20,405 m and an optimal daily capacity of

17,400), respectively 19 cable transport facilities (with a length of 18,553 m and a capacity of 14,557 seats), 6 nighttime facilities and 11 artificial snowmaking facilities.

The Șureanu tourist resort, located in Alba County, the Șureanu Mountains unit, has 10 ski slopes (with a length of 11,710 m and an optimal daily capacity of 8,500), respectively 3 cable transport facilities (with a length of 2,900 m and a capacity of 2,600 seats).

The analysis of the number of ski slopes at locality level highlighted the existence of five typological categories: very large (2 localities, Sinaia and Straja, 30 ski slopes with a length of 39,497.54 m and an optimal daily capacity of 34,080 people), large (4 localities, Păltiniș, Poiana Brașov, Predeal, Șureanu, 35 ski slopes with a length of 41,438 m and an optimal daily capacity of 45,280 people), medium (9 localities, 60 ski slopes with a length of 75,374 m and an optimal daily capacity of 40,310 people), small (11 localities, 40 ski slopes with a length of 29,803.4 m and an optimal daily capacity of 25,840 people) and very small (46 localities, 64 ski slopes with a length of 75,973.4 m and an optimal daily capacity of daily population of 43,473 people) (figure 3).

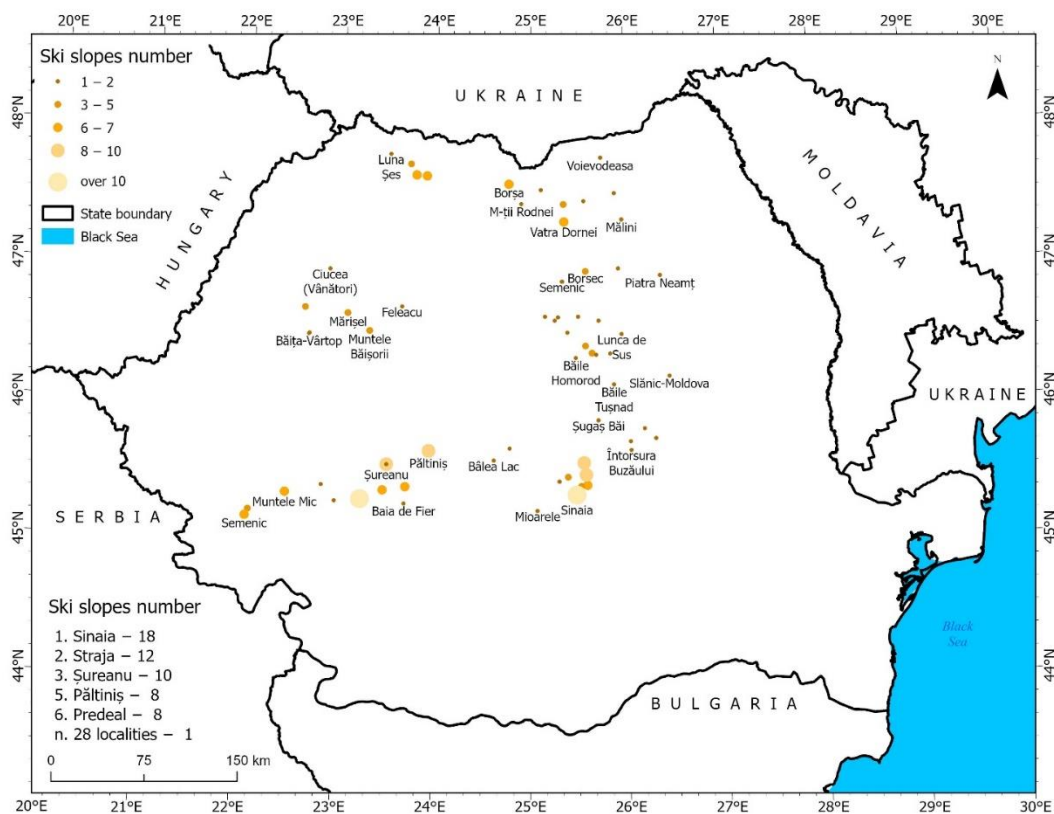


Figure 3. Distribution of the number of ski slopes at locality level

The longest ski slopes were located in the localities of Bâlea Lac (3 units, with a length of 27,000 m and a capacity of 2,000 people), Straja (12 units, with a length of

20,405 m and a capacity of 17,400 people) and Sinaia (18 units, with a length of 19,092.54 m and a capacity of 16,680 people) while the shortest were located in the localities of Ciceu (one ski slope, with a length of 270 m and an optimal daily capacity of 250 people), Comandău (one ski slope, with a length of 300 m and an optimal daily capacity of 500 people) and Întorsura Buzăului (one ski slope, with a length of 350 m and an optimal daily capacity of 500 people).

The analysis of the length of ski slopes at the locality level highlighted the existence of five typological categories: very large (2 localities, Bâlea Lac and Straja, 14 ski slopes with a length of 47,405 m and an optimal daily capacity of 19,400 people), large (5 localities, Borșa, Muntele Mic, Poiana Brașov, Sinaia, Șureanu, 50 ski slopes with a length of 76,488.54 m and an optimal daily capacity of 52,370 people), medium (8 localities, 52 ski slopes with a length of 55,973 m and an optimal daily capacity of 41,940 people), small (6 localities, 31 ski slopes with a length of 22,826.4 m and an optimal daily capacity of 25,690 people) and very small (51 localities, 82 ski slopes with a length of 59,393.4 m and an optimal daily capacity of 49,583 people) (figure 4).

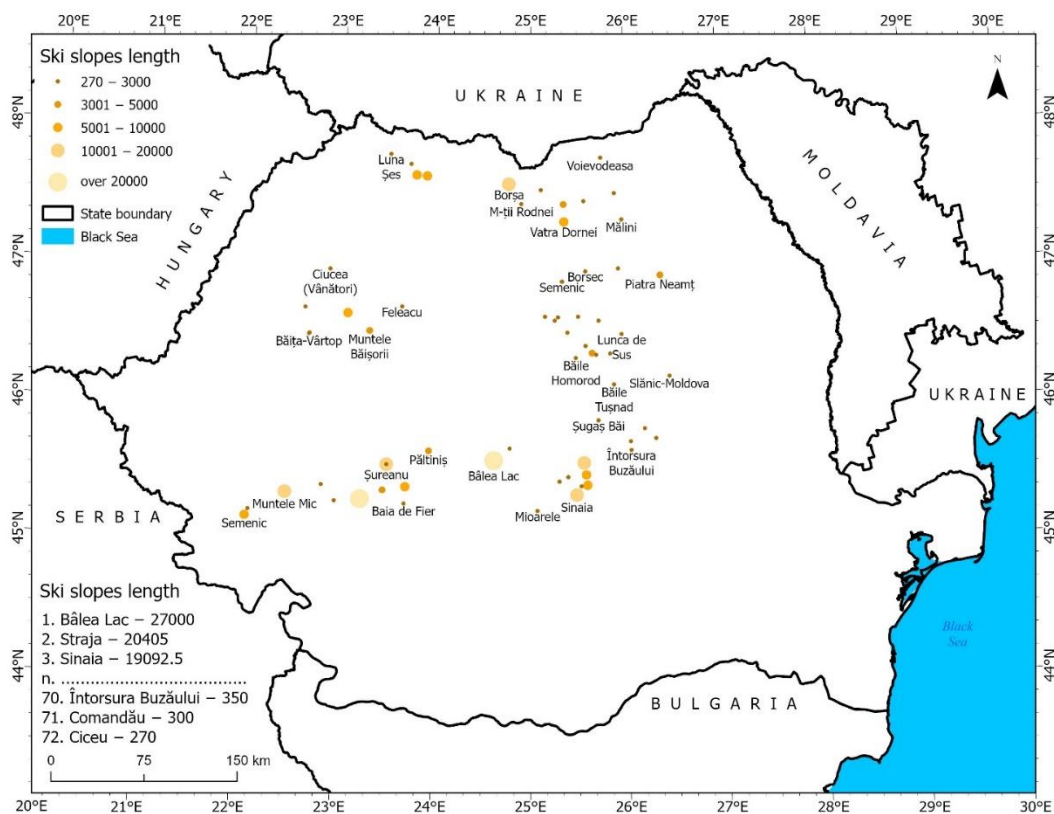


Figure 4. Distribution of ski slope length at locality level

The ski slopes with the highest optimal daily capacity were located in the localities of Straja (12 units, with a length of 20,405 m and a capacity of 17,400 people), Sinaia (18 units, with a length of 19,092.54 m and a capacity of 16,680 people) and Poiana Brașov (9 units, with a length of 16,240 m and a capacity of 14,920 people) while the ski slopes with the lowest optimal daily capacity were located in the localities of Durău (one ski slope, with a length of 406 m and an optimal daily capacity of 150 people), Vârșag (one ski slope, with a length of 1,050 m and an optimal daily capacity of 150 people) and Cheile Buții (one ski slope, with a length of 400 m and an optimal daily capacity of 160 people).

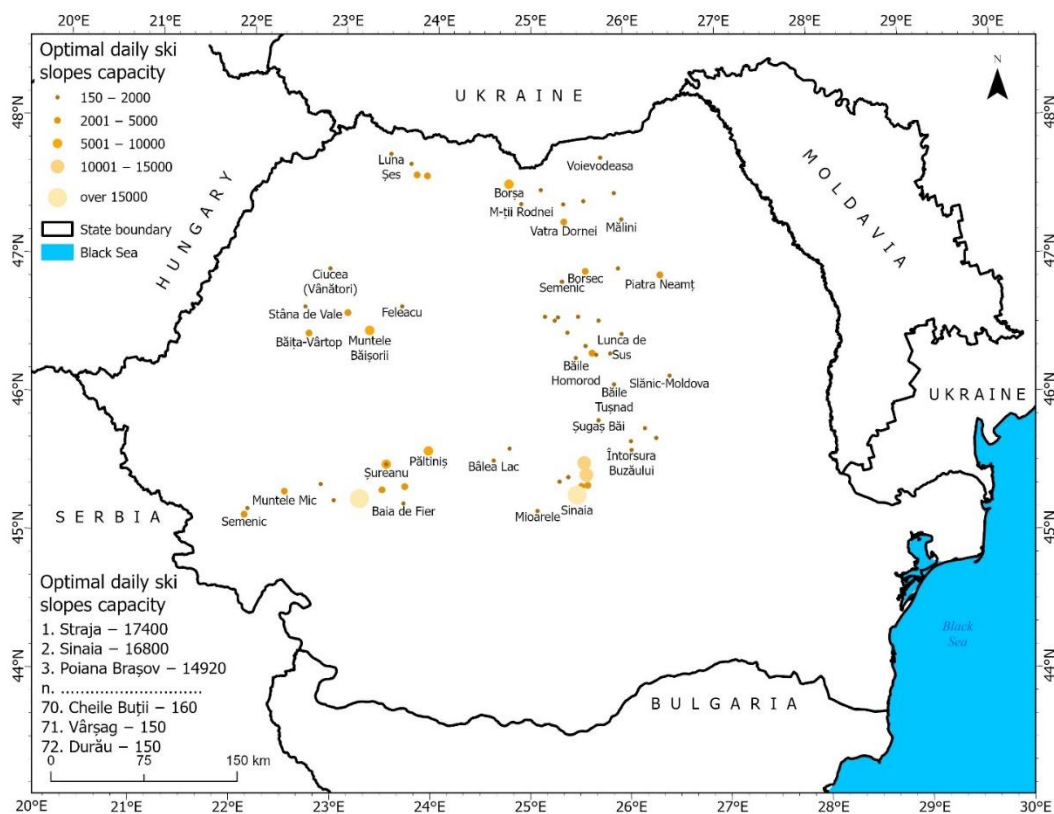


Figure 5. Distribution of optimal daily capacity of ski slopes at locality level

The analysis of the optimal daily capacity of ski slopes at the locality level highlighted the existence of five typological categories: very large (2 localities, Sinaia and Straja, 30 ski slopes with a length of 39,497.54 m and an optimal daily capacity of 34,080 people), large (2 localities, Poiana Brașov and Predeal, 17 ski slopes with a length of 24,770 m and an optimal daily capacity of 29,470 people), medium (3 localities, Borșa, Păltiniș and Șureanu, 25 ski slopes with a length of 27,718 m and an optimal daily capacity of 23,580 people), small (14 localities, 72 ski slopes with a

length of 83,049 m and an optimal daily capacity of 50,340 people) and very small (50 localities, 80 ski slopes with a length of 82,551.8 m and an optimal daily capacity of 45,713 people) (figure 5).

Ski slope analysis at the point level

The analysis of ski slopes at point level based on geographical coordinates (latitude and longitude) is essential from the perspective of investment management, respectively the spatial distribution of the specific related infrastructure.

The analysis of the density of ski slopes per km² highlighted the existence of seven agglomerations, tourist regions for practicing winter sports, namely: Prahova Valley, Southern Carpathians, Harghita Mountains, Maramureş, Bucovina, Semenik and Western Mountains (figure 6).

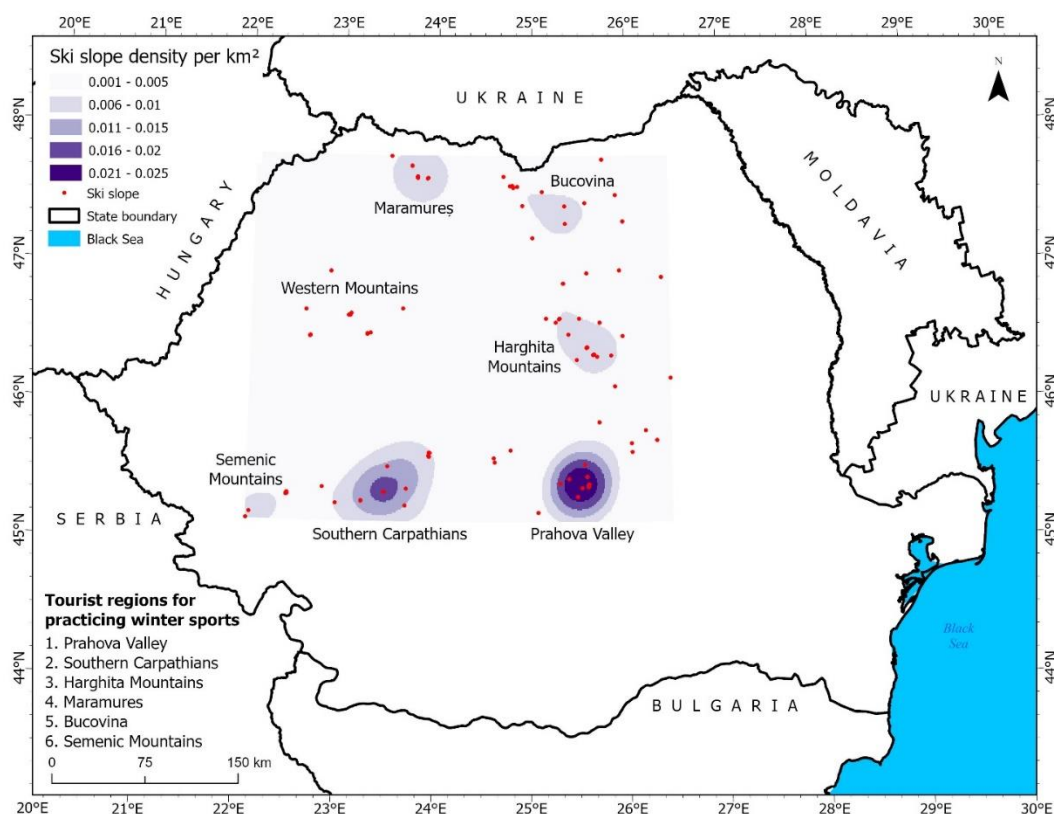


Figure 6. Density distribution of ski slopes

The tourist region of Valea Prahova is located on the border between the Central and Southern development regions, respectively at the contact between Braşov and Prahova counties, in the mountain units of the Bucegi Mountains, the Piatra Craiului Mountains, the Baiului Mountains and the Postăvaru Mountain. The ski slopes (52

units with a length of 57,230.54 m and an optimal daily capacity of 56,060 people) are grouped in seven localities, which also have the status of tourist resorts, namely: Poiana Brașov, Sinaia, Predeal, Azuga, Bușteni and Bran.

The Southern Carpathians tourist region is located at the border between the Central, West and South-West development regions, respectively at the contact between the counties of Hunedoara, Alba, Sibiu, Vâlcea and Gorj, in the mountain units of Șureanu, Căndrel, Lotrului, Căpățâni, Parâng, Retezat and Vâlcanului. The ski slopes (55 units with a length of 79,022.3 m and an optimal daily capacity of 47,910 people) are grouped in six localities, which also have the status of tourist resorts, namely: Straja, Parâng, Șureanu, Păltiniș, Voineasa and Baia de Fier. The Harghita Mountains tourist region is in the Central Development Region, in Harghita county, in the mountain units of Munții Ghurguiului, Giurgeului, Harghitei, Ciuc and Ciomatu. The ski slopes (28 units with a length of 18,913 m and an optimal daily capacity of 16,060 people) are grouped in 15 localities, which also have the status of tourist resorts, namely: Băile Harghita, Băile Homorod, Băile Tușnad, Borsec, Ciceu, Ciumani, Izvoru Mureșului, Joseni, Lunca de Sus, Mădăraș, Miercurea Ciuc, Praid, Toplița, Valea Rece and Vărșag.

The Maramureș tourist region is in the North-West Development Region, in Maramureș county, in the Gutâi Mountains. The ski slopes (17 units with a length of 15,440 m and an optimal daily capacity of 10,740 people) are grouped in 3 localities, which also have the status of tourist resorts, namely: Cavnic, Izvoare and Mogoșa.

The Bucovina tourist region is in the North-East Development Region, in Suceava county, in Obcinele Bucovinei and the Suhard and Giumalău Mountains. The ski slopes (17 units with a length of 16,859.4 m and an optimal daily capacity of 9,513 people) are grouped in 7 localities, which also have the status of tourist resorts, namely: Câmpulung Moldovenesc, Cărlibaba, Gura Humorului, Mălini, Pasul Mestecăniș, Vatra Dornei and Voievodeasa.

The Semenic tourist region is in the West Development Region, in Caraș-Severin County, in Muntele Mic and the Semenicului Mountains. The ski slopes (17 units with a length of 30,876 m and an optimal daily capacity of 12,100 people) are grouped in 3 localities, which also have the status of tourist resorts, namely: Semenic, Brebu Nou and Muntele Mic. The Western Mountains tourist region is located on the border between the Central and North-West Development Regions, respectively at the contact between the counties of Bihor, Alba and Cluj, in the mountain units of Munții Bihorului, Vlădeasa, Gilău and Muntele Mare. The ski slopes (17 units with a length of 15,615 m and an optimal daily capacity of 15,590 people) are grouped in six localities, which also have the status of tourist resorts, namely: Arieșeni, Băița-Vârtope, Ciucea (Vânători), Mărișel, Muntele Băișorii and Stâna de Vale.

Conclusions

The Romanian mountain space is a space of great complexity and ecological importance that hosts fragile ecosystems with rare species of flora and fauna, some of unique value. In this context, knowledge of the spatial distribution of ski slopes represents an essential component of information regarding the human impact on the environment, respectively the need for sustainable development of these spaces.

The analysis of ski slopes at the spatial level (development region, county, locality and slope) is an essential condition for the expansion and development of mountain tourism focused on practicing winter sports. Thus, the analysis of ski slopes, at the level of development regions, counties, localities and the slopes themselves, provided us with a database and an informative situation regarding the possibilities of practicing winter sports in Romania.

As a result of this study, the following conclusions were drawn:

- in 2024, in Romania, there were 229 ski slopes, occupying an area of 1,077.92 ha, with a length of 262,086.34 m and an optimal daily capacity of 188,983 skiers.
- in terms of difficulty, the 229 slopes were classified into 3 typological categories: easy slopes (88 units), medium slopes (101 units) and difficult slopes (40 units).
- the 229 ski slopes were served by 208 facilities with a total capacity of 137490 seats, 86 nighttime facilities and 127 artificial snowmaking facilities.
- the development regions with the largest number of ski slopes were the Center (84 units), Northwest (44 units) and West (39 units) regions.
- at county level, most ski slopes are in Harghita (28 ski slopes), Prahova (27 ski slopes) and Braşov (25 ski slopes).
- at locality level, most ski slopes were in Sinaia, Straja and Sureanu.
- the analysis of the density of ski slopes highlighted the existence of seven tourist regions focused on winter sports, namely: Prahova Valley, Southern Carpathians, Harghita Mountains, Maramureş, Bucovina, Semenic and Western Mountains.

The results obtained can constitute an informational support in the elaboration of the tourism development strategy of the mountain space, as part of the tourism development strategy in Romania. Since the mountain space is characterized by continuity and complexity, it does not take into account the administrative boundaries (region, county, locality), it is necessary to search for the most optimal ways to approach its sustainable development, including through tourism, seen lately as an important alternative in the development of local economies, in close correlation with the local supporting capacity. Therefore, development decisions should be centered on the local population and local decision-makers, in accordance with the profile demand in the immediate vicinity, especially in the urban environment.

The sustainable and responsible development of mountain tourism in Romania requires continued future research to establish the spatial relationships between ski slopes and cable transport infrastructure, as well as the relationships between ski slopes and tourist emission centers.

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References

- Bacoș, I. B., & Gabor, M. R. (2021). Tourism economy. Mountain tourism: Quantitative analysis of winter destinations in Romania. *Economics*, 9(1), 143-159.
- Barros, C. P., & Machado, L. P. (2010). The length of stay in tourism. *Annals of tourism research*, 37(3), 692-706.
- Butnaru, G.I. & Niță, V. (2016). European Union and Romanian Tourism – β and σ Convergence in the Economic Development Regions of Romania. *Amfiteatru Economic*, 18(42), 369-384.
- Cândeia, M., Bran, F., Cimpoiu, I., (2006), *Organizarea, amenajarea și dezvoltarea durabilă a spațiului geografic*, Editura Economică, București.
- Cernaianu, S., & Sobry, C. (2020). The development of ski areas in Romania. What environmental, political, and economic logic?. *Sustainability*, 13(1), 274.
- Ciangă, N., & Deszi, Ș. (2007). *Amenajare turistică*, Editura Presa Universitară Clujeană.
- Ciangă, N., & Răcășan, B. S. (2015). Ski Areas and Slopes in Romania. Reviewing Current State of Winter Sports Tourism Unfolding Possibilities within Carpathian Mountains. *Studia Universitatis Babeș-Bolyai, Geographia*, 60(1), 157-173.
- Cocean P. (2007). *Geografia turismului*, Editura Focul Viu, Cluj Napoca.
- Decree No. 15 of January 23, 1981, on some measures to improve the administrative organization of the territory of the Socialist Republic of Romania (Decretul nr. 15 din 23 ianuarie 1981 privind unele măsuri pentru îmbunătățirea organizării administrative a teritoriului Republicii Socialiste) România. Available online: <https://legislatie.just.ro/Public/DetaliiDocumentAfis/43001> (accessed on 26 March 2025).
- Dickinson, J. E., & Peeters, P. (2014). Time, tourism consumption and sustainable development. *International journal of tourism research*, 16(1), 11-21.
- Erdeli, G., Gheorghilaș, A. (2006). *Amenajări turistice*, Editura Universității din București, București.
- Freppaz, M., Filippa, G., Corti, G., Cocco, S., Williams, M. W., & Zanini, E. (2013). Soil properties on ski-runs. In *The impacts of skiing and related winter recreational activities on mountain environments* (pp. 45-64). Bentham Science Publishers.
- Gingulescu, D. M., & Cocean, P. (2011). Proiecte de dezvoltare și extindere de noi domenii schiabile în România. *Palestrica of the Third Millennium Civilization & Sport*, 12(4), 398-403.

- Gingulescu, D. M., & Cocean, P. (2011a). Proiecte de dezvoltare și extindere de noi domenii schiabile în România. *Palestrica of the Third Millennium Civilization & Sport*, 12(4), 398-403.
- Gingulescu, D. M., & Cocean, P. (2011b). Rolul factorilor climatici în evaluarea potențialului schiabil. *Palestrica of the Third Millennium Civilization & Sport*, 12(3), 248-253.
- Gingulescu, D. M. (2010). *Potențialul schiabil Romaniei*, Rezumatul tezei de doctorat, <https://www.scribd.com/document/131276696/Potențialul-Domeniului-Schiabil-Romania>
- Gondos, B., & Nărai, M. (2019). The opportunities in accessible tourism. *The USV Annals of Economics and Public Administration*, 19(1), 48-57.
- Haller, A. P. (2017). Dezvoltarea regională a României în context European. In *Dezvoltarea economico-socială durabilă a euroregiunilor și a zonelor transfrontaliere* (Vol. 30, pp. 282-292).
- Herman, G. V., Blaga, L., Filimon, C., Caciora, T., Filimon, L., Herman, L. M., & Wendt, J. A. (2024a). Spatial Distribution of Relationship between Historical Monuments and Tourism: The Case Study of Bihor County in Romania. *Land*, 13(5), 668.
- Herman, G. V., Grama, V., Buhaș, S., Garai, L. D., Caciora, T., Grecu, A., ... & Peptenatu, D. (2021). The analysis of the ski slopes and the degree of economic dependence induced by winter sports tourism. The case of Romania. *Sustainability*, 13(24), 13698.
- Herman, G. V., Grama, V., Ilieș, A., Safarov, B., Ilieș, D. C., Josan, I., ... & Caciora, T. (2023). The Relationship between Motivation and the Role of the Night of the Museums Event: Case Study in Oradea Municipality, Romania. *Sustainability*, 15(2), 1738.
- Herman, G. V., Tătar, C. F., Stașac, M. S., & Cosman, V. L. (2024c). Exploring the Relationship between Tourist Perception and Motivation at a Museum Attraction. *Sustainability*, 16(1), 370.
- Herman, G.V., Deac, L.A., Șandra, M., Bulz, C., Herman, M.L., Caciora, T., & Oanț, C.I. (2024b). Analysis of the Degree of Knowledge and Perception Regarding the Development of Tourist Routes in Luncașprie Destination, Romania. *Geojournal of Tourism and Geosites*, 55(3), 997–1004.
- Ilie, L. (2013). Relief suitability to purpose of developing the ski domain in Obârșia Lotrului area. *Cinq Continents*, 3(7), 58-72.
- Ilie, L. A., Comănescu, L., Dobre, R., Nedelea, A., Săvulescu, I., Bradea, I. A., & Boloș, M. I. (2020). Fuzzy techniques for artificial snow cover optimization in the ski areas. case study: Obârșia Lotrului (Southern Carpathians, Romania). *Sustainability*, 12(2), 632.
- Ilieș, M. (2007). *Amenajare turistică*, Editura Casa Cărții de Știință, Cluj Napoca.
- Law No. 2 of February 16, 1968, on the administrative organization of the territory of the Socialist Republic of Romania (Legea nr. 2 din 16 februarie 1968 privind organizarea administrativă a teritoriului Republicii Socialiste România), Available online: <https://legislatie.just.ro/public/DetaliiDocument/189> (accessed on 26 March 2025).
- Law no. 50 of 9 April 1997 amending Article 126 of Local Public Administration Law no. 69/1991, republished (Legea nr. 50 din 9 aprilie 1997 pentru modificarea articolului 126 din Legea administrației publice locale nr. 69/1991, republicată) Available online: <https://legislatie.just.ro/Public/DetaliiDocument/11313> (accessed on 26 March 2025).
- Lesenciuc, C. D., Boengiu, S., & Huțupașu, M. (2013, June). The characteristics of the ski domains from the Romanian Carpathians. In *Forum geografic* (Vol. 12, No. 1, pp. 89-99).
- Muntele, I., & Iașu, C. (2003). *Geografia turismului: concepte, metode si forme de manifestare spatio-temporala*. Iasi, Romania: Sedcom Libris.
- National Agency for Cadastre and Real Estate Advertising (2025). Administrative limits download. Available from: <https://www.ancpi.ro/> [21 March 2025].
- National Authority for Tourism (ANT). Available online: <http://turism.gov.ro> (accessed on 1 March 2025).
- National Institute of Statistics. (2025). *ADM101A - Administrative organization of the territory, by categories of administrative units, macroregions, development regions and counties, (ADM101A - Organizarea administrativa a teritoriului, pe categorii de unitati administrative, macroregiuni, regiuni de dezvoltare si judete)*. Available online: <http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table> (accessed on 20 Martie 2025).
- National Institute of Statistics. (2025). *POP108D - Population by domicile on July 1 by age and age groups, sexes, counties and localities (POP108D - Populatia dupa domiciliu la 1 iulie pe grupe de varsta si varste, sexe, judete si localitati)*. Available online: <http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table> (accessed on 15 March 2025).
- Nedelcu, A. (2015). *Geografia turismului*. Editura Universitară.

- Pintaldi, E., Hudek, C., Stanchi, S., Spiegelberger, T., Rivella, E., & Freppaz, M. (2017). Sustainable soil management in ski areas: threats and challenges. *Sustainability*, 9(11), 2150.
- Popan, D. (2022). Analiza spațială a terenului în vederea realizării unei pârtii de schi din zona Predeal. In *Conferința tehnico-științifică a studenților, masteranzilor și doctoranzilor*, vol. 2, pp. 112-115.
- Sandu, D. (2011). Social disparities in the regional development and policies of Romania. *International Review of Social Research*, (1), 1-30.
- Sharpley, R. (2002). Tourism: A vehicle for development. *Tourism and development: Concepts and issues*, 2, 11-34.
- Ski in Romania. Available online: www.ski-in-romania.com (accessed on 20 Martie 2025).
- Teodor, M. *Aplicații GIS Pentru Proiectarea, Dezvoltarea și Managementul Domeniilor Schiabile din România*. Rezumatul Tezei de Doctorat. București. 2016. Disponibil online: https://www.researchgate.net/publication/327963625_Aplicatii_GIS_pentru_proiectarea_dezvoltarea_si_managementul_domeniilor_schiabile_din_Romania (accesat pe 10 mai 2020).
- Teodor, M., Dobre, R., Ilie, L., & Stanoiu, G. (2017). An Analysis Model for Identifying the Functionality of the Ski Slopes in Romania. *Lucrări și rapoarte de cercetare*, 101-103.
- Tofan, G. B., & Păcurar, B. N. (2013). Aspects Regarding the Ski Areas of the Central Development Region. *GeoJournal of Tourism and Geosites*, 12(2), 175-184.
- Tóth, G., & Dávid, L. (2010). Tourism and accessibility: An integrated approach. *Applied Geography*, 30(4), 666-677.
- Tour - National Project of Tourist Information and Promotion. Available online: <https://www.i-tour.ro> (accessed on 10 March 2025).
- Tourist Romania Travel Agency. Available online: <http://www.romaniaturistica.ro> (accessed on 25 March 2025).
- Voiculescu, M., Popescu, F., Török-Oance, M., Olaru, M., & Onaca, A. (2011). Features of the Ski Area from the Romanian Banat. In *Forum geografic. Studii și cercetări de geografie și protecția mediului*. 10(1), 58-69.
- Yang, J., & Wan, C. (2010). Progress in research on the impacts of global climate change on winter ski tourism. *Advances in climate change research*, 1(2), 55-62.