

Geoarchaeological considerations on the Arpad Line with relevance to tourism. Case study: Bistrița-Năsăud County (Romania)

Considérations géoarchéologiques sur la ligne Arpad en rapport avec le tourisme. Étude de cas : comté de Bistrița-Năsăud (Roumanie)

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ABSTRACT: On the peaks of the Eastern Carpathians there is a system of fortifications set up during the Second World War by the Horthy Miklos' troops, to defend the eastern border of Hungary expanded after the Second Vienna Award. These fortifications are called the Arpad Line and they joined other fortified lines of Europe such as the Maginot Line, the Siegfried Line, the Stalin Line, the Mannerheim Line, and the Metaxas Line. Within this system of fortifications, there are trenches, firing positions, positions for artillery pieces, bunkers, casemates and concrete anti-tank obstacles (dragon's teeth). In Bistrița-Năsăud county, the Arpad Line is present in the mountain areas of Călimani, Bîrgău, Suhard and Rodnei, but also in the Someșului Mare Hills and the Bistriței Hills. As military and historical evidence, the fortifications within the Arpad Line are distinguished by geoarchaeological, cultural-educational and touristic value, which could be exploited by local communities. The present study attempts to inventory, evaluate and analyze these fortifications from a geoarchaeological and tourist perspective, to include them in the attractive tourist resources of Bistrița-Năsăud County and the Eastern Carpathians.

KEY WORDS: sapper, archaeological tourism, military tourism, cultural heritage.

RÉSUMÉ : Sur les sommets des Carpates Orientales se trouve un système de fortifications érigé pendant la Seconde Guerre mondiale par les troupes de Horthy Miklos, pour défendre la frontière orientale de la Hongrie, élargie après le Diktat de Vienne. Ces fortifications sont appelées Ligne Arpad et rejoignent d'autres lignes fortifiées d'Europe telles que la Ligne Maginot, la Ligne Siegfried, la Ligne Staline, la Ligne Mannerheim et la Ligne Metaxas. A l'intérieur de ce système de fortifications se trouvent des tranchées, des positions de tir, des positions de pièces d'artillerie, des bunkers, des casemates et des obstacles antichar en béton (dents de dragon). Dans le département de Bistrița-Năsăud, la Ligne Arpad est présente dans les zones montagneuses de Călimani, Bîrgău, Suhard et Rodnei, mais aussi dans les collines de Someșul Mare et de Bistrița. En tant que preuve militaire et historique, les fortifications de la Ligne Arpad se distinguent par leur valeur géoarchéologique, culturelle, éducative et touristique, qui pourrait être exploitée par les communautés locales. La présente étude tente d'inventorier, d'évaluer et d'analyser ces fortifications d'un point de vue géoarchéologique et touristique, afin de les inclure dans les ressources touristiques attractives du département de Bistrița-Năsăud et des Carpates Orientales.

MOTS CLÉS : génie militaire, sapeur, tourisme archéologique, tourisme militaire, patrimoine culturel.

1. Introduction

Following the Second Vienna Award, a large part of Transylvania was ceded to Horthy Hungary, and its borders extend eastward to the Eastern Carpathians. To secure these borders, between 1942 and 1944, a system of fortifications, called the Arpad Line (after the Arpadian dynasty), initiated by Colonel Theophilus Harosy, head of the engineering corps of the Hungarian army, will be set up.

Such fortification systems were erected in many parts of Europe after the First World War, to secure vulnerable points within the borders, among which we can mention: the Maginot Line (1929-1938), built by the French on the border with Germany, the Siegfried Line (1936) built by the Germans on the border with France, the Stalin Line (1920-1945), built on the western border of the Soviet Union, the Mannerheim Line (1920-1939) built by the Finns on the border with the Soviet Union, the Metaxas Line (1936-1941), set up by the Greeks on the border with Bulgaria (Figure 1).

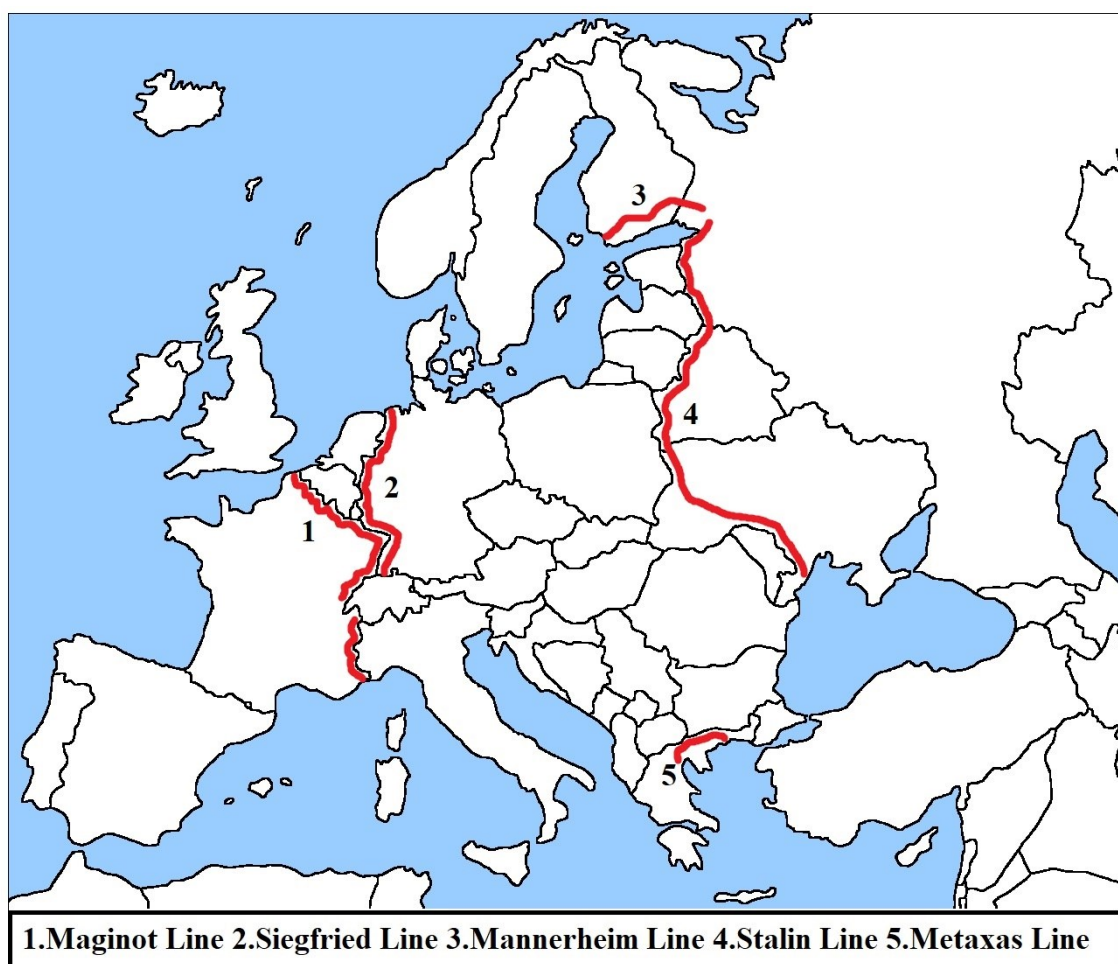


Figure 1 The lines of fortifications in Europe starting with the interwar period and until the end of the Second World War. (source: https://rebeluniv.blogspot.com/2013/europe-map.html-with_personal_contribution).

A comparison between these fortification systems is necessary to capture certain geopolitical, spatial, structural and cultural characteristics. Geopolitically, each of these fortifications reflects the unique geopolitical situation, military strategy, and technological capabilities of their time. The Maginot Line and the Siegfried Line are often compared due to their similar goals of preventing a Franco-German conflict, although both became obsolete due to changing military tactics. The Mannerheim Line and Stalin Line highlight the challenges of defending vast borders, while the Metaxas Line and Árpád Line feature smaller regional defenses that were eventually bypassed during the rapid campaigns of World War II. The effectiveness of each line depended heavily on the strategic environment, the technology of the era, and the ability to adapt to changing war tactics. In terms of length and spatial extent, it is noted that the length of these lines of fortifications differ, depending on the length of borders and neighborhoods. The longest line of fortifications is the Stalin Line which covered over 1,000 km, stretching across several countries and over a large area of the western border of the Soviet Union. Next came the Siegfried Line which extended 630 km along the western border of Germany, while its counterpart, the Maginot Line was somewhat shorter, 450 km along the eastern border of France. The other fortification systems were shorter, being designed to secure key regions such as the Balkans (Metaxas Line, 200 km), the Carpathians (Árpád Line, 200 km) and the Karelian Isthmus (Mannerheim Line, 135 km).

Structurally, each of these lines of fortification was designed to suit the specific needs of the country and terrain it defended. The Maginot Line and Siegfried Line were the most technologically advanced, with intricate concrete bunkers, artillery positions and underground networks. The Mannerheim Line and Stalin Line used multiple field fortifications and integrated natural features to strengthen the defenses. The Metaxas Line and the Árpád Line were based on more rudimentary, though still effective at the time, defenses adapted to mountainous or regional terrain.

The terrain in which these fortifications were built played a significant role in their design, effectiveness and strategic value. Each line of fortifications was built to take advantage of – or counter – the geographical features of its location, such as natural choke points, mountains, forests, rivers or open plains. Mountains and forests (as seen in the Mannerheim, Metaxas, and Arpad Lines) provided natural defensive advantages, while rivers and marshes (such as those along the Siegfried Line and the Stalin Line) created natural barriers. However, the ability to bypass or outflank the defenses, especially in flat or open terrain (such as around the Maginot Line and the Árpád Line), was a significant vulnerability. Ultimately, the terrain shaped both the strategic thinking behind each line and the challenges the defenders faced in manning these fortifications. Today, many of these historic fortifications have been turned into popular tourist destinations, especially for those interested in military history, architecture and World War II. Guided tours, museums, interactive exhibits, and even re-enactments allow visitors to engage with the past in meaningful ways. The tourism impact varies: some fortifications, such as the Maginot Line and the Mannerheim Line, attract large numbers of visitors, while others, such as the Stalin Line and the Árpád Line, remain niche attractions with growing potential for educational and heritage tourism (Kaufmann, Kaufmann Potocnik, Lange, 2011; Rottman, 2005; Rottman, 2007; Short, 2000; Szabo, 2002).

This Arpad Line system of fortifications started in the Oituz Pass followed the Carpathian massifs of Nemira, Ciucului, Giurgeului, Călimani, Bârgău, Rodnei and Maramureş Mountains, after which it passed over the peaks of the Beskidis in Ukrainian Transcarpathia and Slovakia, ending at the contact with the Polish Plain (Szabó, 2002 a, b). (Figure 2).



Figure 2 The fortification system of the Eastern Carpathians in 1944. (source: <http://arpad.lapok.hu/keret.cgi?/arpad/vonal.html-with changes>).

The Arpad Line, in addition to defending the borders of Horthy Hungary, also served the interests of Nazi Germany by protecting its distant borders, and the oil fields of the Hungarian Transdanubian region.

From the observations carried out on the ground, in the structure of the Arpad Line there are trenches, individual firing positions, machine gun positions, positions for artillery pieces, casemates, concrete bunkers, anti-tank obstacles ("dragon's teeth"), located in relevant places, such as peaks and ridges, passes, slopes with views of valleys and valley bottoms.

In connection with the erection of these fortifications, we must mention several aspects, such as:

- only high-quality Portland cement was used to obtain the concrete;
- the gravel necessary for the preparation of the concrete was brought, for the most part, by train from Nyekladhaza, northern Hungary, but local gravels from sandstone, andesite, basalt, and limestone were also used;
- the casemates and bunkers were raised in pits, after removing large masses of soil, being then surrounded with broken stone, and covered with a 30-40 cm layer of soil for camouflage purposes;
- the open firing positions (trenches, individual niches) were designed at convenient angles to be able to cover each other with covering fire;
- the concrete was prepared manually by manual laborers, and the movement of the material on the slopes, towards the location, was done by improvising a transport system based on winches,

wagons, and rails from mining railways, confiscated from the various exploitations in the abusive areas busy;

-in the casemates, each soldier had 4 cubic meters of air, enough for 4 hours of standing;

-in front of the bunkers and casemates, on the passage corridors, concrete pyramids ("dragon's teeth") were lined up, which were meant to block the advance of the tanks; also, with the same role, steel columns bent and embedded in concrete were used;

-the casemates were also supported by a dense network of trenches, barbed wire, watchtowers, and thousands of mines buried in the ground, all of which made the fortified sectors relatively difficult to penetrate through frontal attacks, only eventual maneuvers on the flanks being successful to win;

-on the eastern slopes in front of the bunkers (from where the enemy could advance), the woods were partially removed for visibility, and the logs were piled at the base of the slope in order not to allow the Soviet infantry or tanks to easily advance to the location in case the other components of the defense network would have failed.

In 1944, with the approach of the Red Army, two more fortification systems were added to the Arpad Line, built in the Carpathian submontane region, so that the enemies could not penetrate the entire defensive system through a "military column" type attack. It is about the Hunyadi and Szent Laszlo Lines, erected in front of the Arpad Line, which had the role of creating difficulties in the movement of Russian troops towards the Ukrainian Carpathians (respectively the Oriental Beskdis, and the Maramureş Mountains beyond the current border of Romania).

The fortifications within the Arpad Line constitute a particularly important cultural-historical heritage, with scientific, didactic, and educational connotations (evidence of military architecture specific to the Second World War), but also attractive for military tourism.

This form of tourism, based on military resources, represents a niche branch of cultural tourism, which capitalizes on historical and military resources, represented by: battlefields, fortifications, museums, monuments, cemeteries, military bases, events of a military nature (commemoration of historical moments, laying of wreaths, exhibitions and demonstrations related to military equipment, aerial demonstrations etc.) (Coelho, 2011; Zienkiewicz& Podciborski&Kaźmierczak&2021; Mateus&Marques&Pedro&Simões2023; Alisherovna, 2023; Chen&Ye&Yu2024).

Therefore, two major forms of military tourism can be delineated, as follows:

1) cultural-historical tourism:

-visiting battlefields, fortifications, ruins, roads, museums, memorials, cemeteries, concentration camps, military bases; the interpretation of some military situations from different periods; participation in events: laying of wreaths, scientific communications, military demonstrations (parades, combat technique exhibitions, military exercises), workshops (rudimentary weapons making, combat techniques), visits and social events with military personnel;

2) adventure tourism:

-shooting with weapons, archery, javelin throwing, paintball, driving military vehicles, parachute jumps, training (rope climbing and descending, climbing artificial walls, zip lining, crossing suspension bridges, obstacle courses, instruction winter, survival).

For the present study, the geoarchaeological offer represented by the fortifications belonging to the Arpad Line on the territory of Bistrița-Năsăud county would target cultural-historical tourist activities, visiting the fortifications and exploiting information on a didactic and educational level.

2. Study area



Figure 3 Geographical location of Bistrița-Năsăud county within Romania. (source: Județele României/Wikipedia.org-with modifications).

Bistrița-Năsăud county is located in the central-northern part of Romania (Figure 3), having the geomorphology arranged in the form of an amphitheater, falling from N-NE-E to S-SW-W, within which there are three morphometric steps (Bîca&Onofreiu, 2016):

- the mountain step (corona montium), made up of the areas of Țibleș, Rodna, Suhard, Bârgău, and Călimani Mountains;
- the step of the high hills, consisting of the Someșului Mare Hills and the Bistriței Hills;
- the step of the low hills of the Transylvanian Plain (Figure 4).

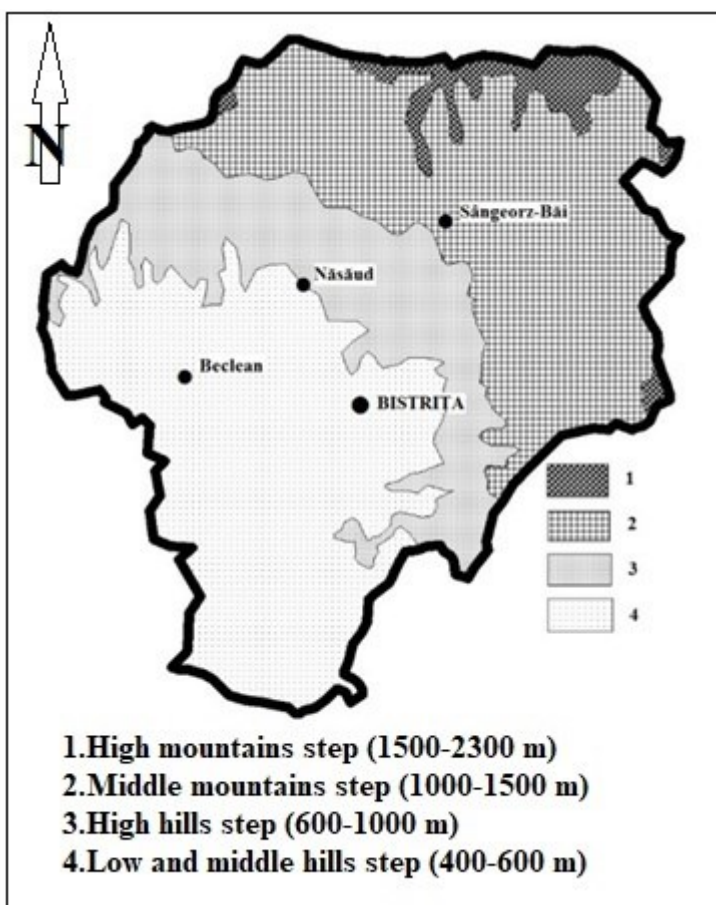
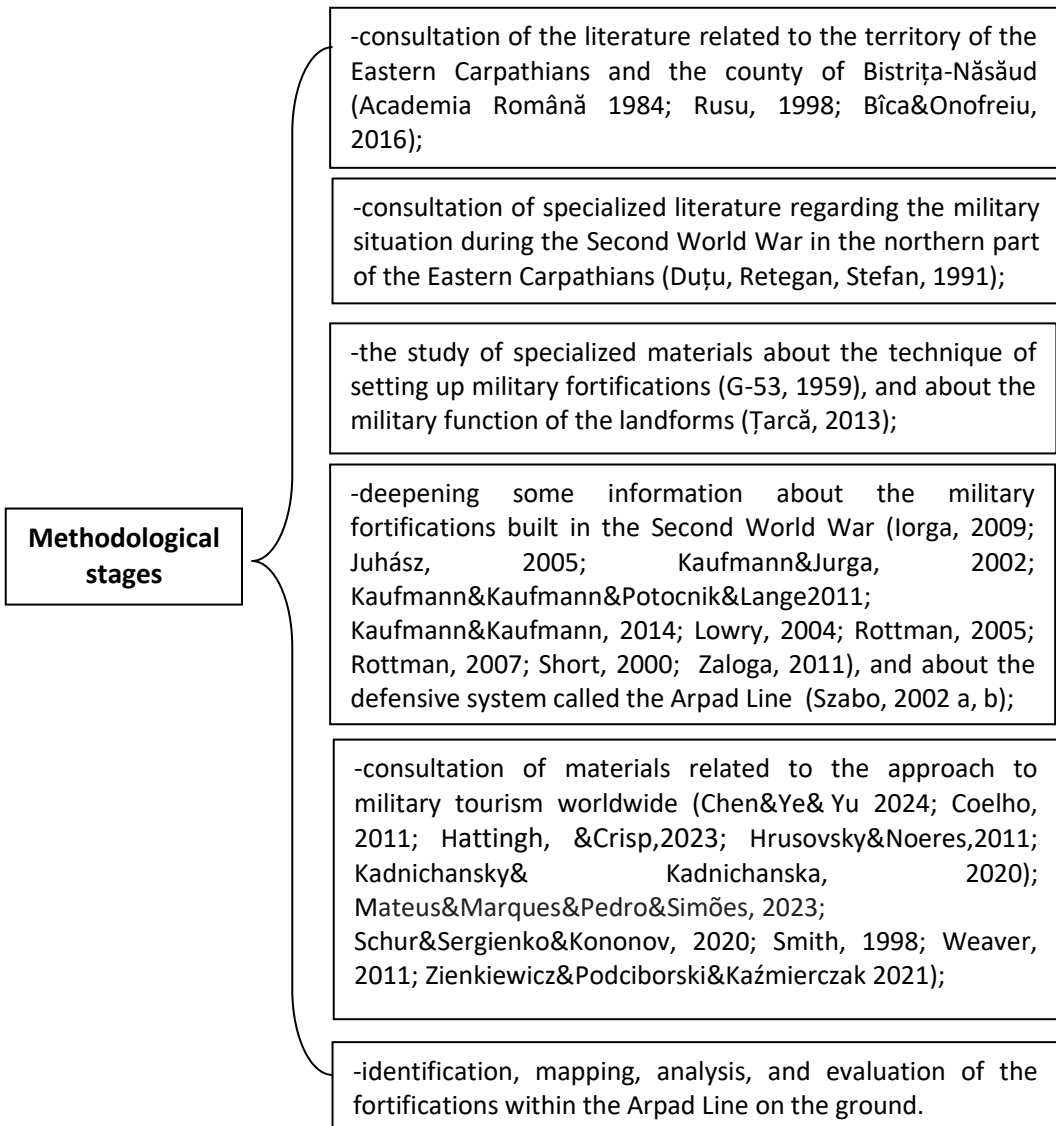


Figure 4 Geomorphological steps of Bistrita-Năsăud County. (source: Bîca&Onofreiu, 2016).

Located between Bucovina and Transylvania, the territory of Bistrița-Năsăud county represented during the Second World War a natural bastion that had to be fortified to secure the eastern borders of Hungary, and to supervise the lanes through which they could have penetrated, from the east, the enemy Soviet armies. These couloirs, in fact, some real geographical axes, were represented by valleys, depressions, and passes, through which the connection between Bucovina and Transylvania was ensured, respectively Bistrița Aurie valley-Rotunda Pass, Dorna Depression-Suhard Pass and Tihuța Pass, Dorna Valley-Terha Pass, the Mureș valley-Vătava Pass, and Scurtu Pass (Figure 5).

3. Methods

To carry out this study, the following methodological stages were completed:



4. Results and discussion

4.1. Distribution of fortifications

On the territory of Bistrița-Năsăud County, the fortifications of the Arpad Line can be found both within the Călimani, Bîrgău, Suhard, and Rodnei mountain units, as well as in the Someșului Mare and Bistrița Hills (Figure 5).

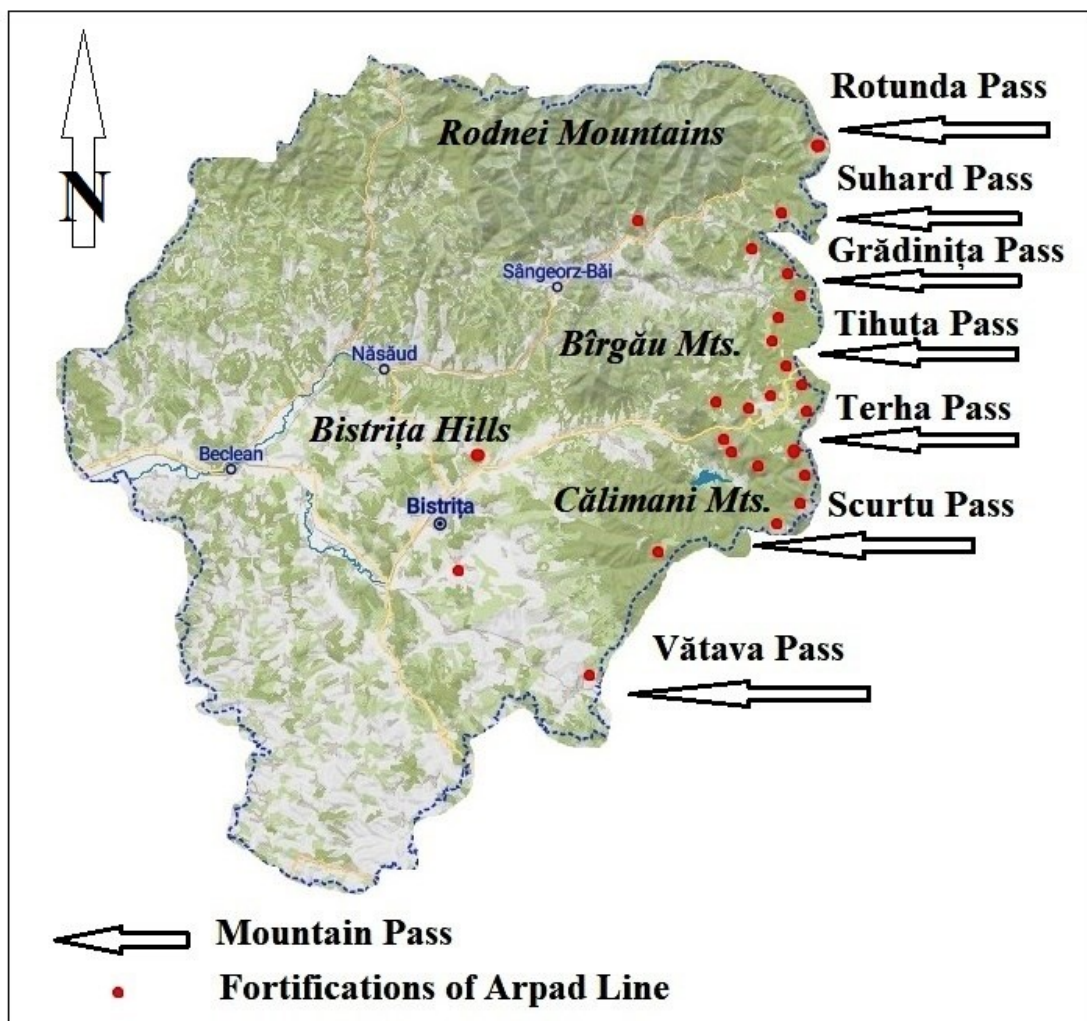


Figure 5 The mountain passes and the fortifications of the Arpad Line on Bistrița-Năsăud County territory. (source: https://geoportal.ancpi.ro/inis_viewer/index.html?locale=ro-with_personal_contributions).

The location of the fortifications was made according to the possible directions of penetration of the enemy armies, which were:

a) first-order penetration directions:

- Bistrita Aurie Valley-Rotunda Pass-Someșului Mare Valley;
- Dornelor Depression-Coșnei Valley-Suhard Pass-Măriilor Valley-Someșului Mare Valley;
- Dornelor Depression-Teșnei Valley-Grădinița Pass-Ilvei Valley;

- Dornelor Depression-Tihuța Pass-Bârgăului Gorge-Bârgăului Valley;
- Mureș Valley-Vătava Pass-Șieului Valley;

b) second-order penetration directions:

- Dornei Valley-Terha Pass-Izvorul Lung Valley-Colibita;
- Dornei Valley-Dornișoara-Șendroaia Summit-Piatra Fântânele-Bîrgăului Valley;
- Răstoliței Valley-Scurtu Pass-Bistriței Ardelene Valley;
- Dornelor Depression-Tihuța Pass-Obcioara Summit-Obcioara Pass-Iliuța Bozghii Valley;

Regarding the geomorphological location of the fortifications, it is observed:

a) fortifications located in the passes:

- Grădinița Pass, between the valley of Teșna and the valley of Ilva: trenches, individual firing positions;
- Tihuța Pass, between Dornelor Depression, and Bîrgăului Valley: trenches, individual firing positions;
- Suhard Pass, between the Coșnei Valley, and the Măria Mare Valley: trenches, individual firing positions;
- Rotunda Pass, between the valley of Bistrita Aurie, and the Valley of Someșului Mare: trenches, concrete casemates;
- Vătava Pass, between the Mureș Valley, and the Luțulu, and Șieu Valley: trenches;

b) fortifications located at the bottom of the valleys and on their slopes:

- Șendroia Valley: concrete casemates, trenches, individual firing positions;
- Bîrgăului Gorge-Străjii Valley: concrete casemates;
- Teiului Valley-Someșului Mare Valley: firing positions, concrete casemates;

c) fortifications located on summits and peaks:

1) in the Suhard Mountains:

- Omu Peak: trenches, individual firing positions (with views towards the Rotunda Pass, the valley of Someșului Mare, and to Bistrița Aurie Valley);

2) in the Bîrgău Mountains:

- Suhărzel Peak: trenches, individual firing positions (with perspectives on the Suhard Pass and the Coșna valley);
- Poiana Mare Peak (Șanț commune): trenches, individual firing positions (with views over the Someșului Mare Valley);
- Cucureasa-Șuvărosu Summit: trenches, firing positions, shelters for artillery pieces (with views of the Someșului Mare Valley, and the Rotunda Pass);
- Poiana Acastăilor Summit: trenches, individual firing positions (with views over the Grădinița Pass, and the Ilva Valley);
- Teiului Summit: concrete casemates, trenches, locations for artillery pieces (with views over the Someșului Mare Valley);
- Măgura lui Arsenț massif: trenches (with perspectives on Ilva Valley);
- Măgura Mare massif: trenches, firing positions (with perspectives on Someșului Mare valley);
- Cotul Mare Peak: trenches, firing positions (with views towards the Ilvei Valley, and the Tihuța Pass);
- Măgura Corni massif: trenches and individual firing positions (with views towards the valley of Ilva, and Someșului Mare);
- Păltineasa Peak: trenches (with views towards the Ilva Valley);
- Ponce Hill (Ilva Mică): concrete casemates, "dragon's teeth" (with views towards the Someșului Mare and Ilva valleys);
- Tisa Hill: trenches under the Chicera peak (with views towards the Leșului valley);

- Frumușeasca massif: trenches, individual firing positions, anti-aircraft firing position (with views towards the Tihuța Pass);
 - Tășuleasa massif: order point, casemate, trenches (with views towards the Tihuța Pass);
 - Paltin Hill: firing positions (oriented to Iliuța Valley);
 - Merezuri Summit: trenches, firing positions (oriented to Iliuța Valley);
 - Obcioara Summit: concrete casemates, trenches, shelters for artillery pieces, individual firing positions (with views towards the road between Vatra Dornei, and Bistrița);
 - Miroslava Summit: concrete casemate (facing the Tihuța Pass);
 - Poiana Narota: trenches, firing positions (with views to Miroslava massif);
 - Poiana Arendaș: trenches, firing positions (facing Arendaș Pass between Iliuța Bozghii Valley and Tureac Valley);
 - Măgura Calului massif: trenches (facing Tihuța Pass);
 - Calul Hill: trenches (facing the Tihuța Pass);
 - Zimbru Hill: trenches (with perspectives on the Tihuța Pass, and the road from Dornișoara to Piatra Fântânele);
 - Zimbroaia Summit: trenches, individual firing positions, concrete casemates (with perspectives on the Tihuța Pass and the road from the Bârgăului valley);
 - Precub Hill: trenches, individual firing positions (with views of the road from the Bîrgăului Gorge);
 - Corca Hill: concrete casemates, trenches (with perspectives on the road from the Bîrgăului Gorge);
 - Tihuța Hill: trenches, casemate, "dragon's teeth" (with perspectives on the road from Bîrgăului Gorge);
 - Orb Hill: trenches, individual firing positions (with views towards the Tihuța Pass);
 - Colibelor Hill: individual shooting locations (with views towards the Leșului Valley);
 - Heniu Summit: individual shooting locations (with views towards the Leșului Valley);
 - Magurița-Arșita massif: trenches (with views towards the Bîrgău valley, and Bistrița Ardeleană valley);
 - Prislop Peak: artillery fire positions (with view towards Dorna Valley);
- 3) in the Rodnei Mountains:
- Lazului Peak (Rodna commune): trenches (with perspectives on the Someșului Mare Valley);
 - Capu Beneșului Peak: trenches (with perspectives on the Someșului Mare Valley);
 - Cobășel summit: trenches (with view to Rotunda Pass and Someșul Mare Valley);
- 4) in the Călimani Mountains:
- Scurtu-Zurzugău Summit: trenches (with views towards the valley of Răstolița, a tributary of the Mureș river, and towards the valley of Bistrița Ardeleană);
 - Bistricior Peak: trenches (with views towards the valleys of Dorna, Bistrița Ardeleană, and Mureș);
 - Vătava Summit: trenches (with views towards the Mureș valley);
- 5) The Hills of Someșului Mare River:
- Frășiș Summit (Ilva Mică): concrete casemates, trenches;
 - Stăniștea Hill (Telciu): circular trench, individual firing pit;
 - Miga Hill (Salva): trenches, firing positions;
- 6) The Hills of Bistrița:
- Nimigea Hill (Lower Nimigea): trenches, individual firing positions (with views of the road from the Someșului Mare Valley);
 - Unirea: trenches, individual firing positions (with perspectives on the road from Bistrița Ardeleană Valley);

-Măgura Simionești massif: trenches, firing positions (with perspectives towards the Budacului Depression).

4.2. Geo-archaeology problems

The rocks in which the fortifications were dug are:

-sedimentary rocks: calcareous sandstones, marls, limestones, clays (Bîrgău Mountains), Sarmatian conglomerates (Bistrița Hills);

-metamorphic rocks: crystalline shale (Suhard Mountains, Rodnei Mountains);

-volcanic rocks: andesites (Călimani Mountains-Bistriceior massif; Bîrgău Mountains-Miroslava Summit, Zimbroaia, Frumușaua, Tășuleasa, and Măgura Calului massifs) (Figure 6) (Geologic Map of Romania, 1967; Rusu, 1998).

The processes of soil formation affected all the fortifications. The soil layer is thicker on sedimentary rocks and thinner on volcanic, and metamorphic rocks. The vegetal carpet that has settled on the ground is represented by grassy vegetation, bushes, and forest. Soil formation and the establishment of vegetation blur the fortifications, and there are cases where they are more difficult to see.

As a stratigraphic position, the fortifications were arranged:

-in the upper soil layer: trenches, firing positions, positions for artillery pieces;

-in the bedrock: trenches, concrete casemates, bunkers, tunnels.

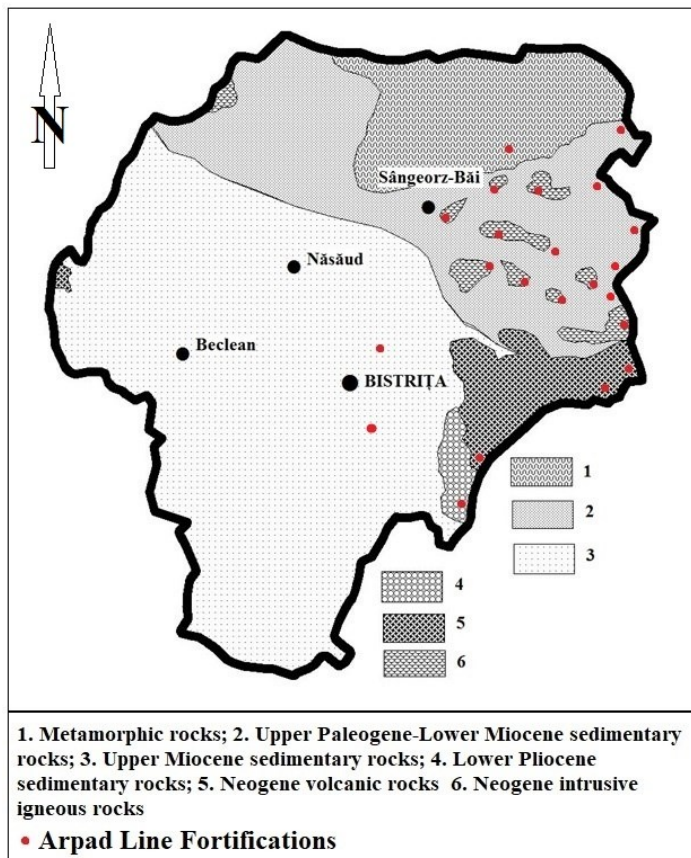


Figure 6 The geologic map of Arpad Line in Bistrița-Năsăud County (source: *Geologic Map of Romania, 1967, with personal contribution*).

By their shape, and development, the fortifications constitute forms of anthropogenic relief (military relief) made by excavation, and accumulation (trenches, firing positions, artillery shelters), and by excavation, concreting, and covering with soil (bunkers, casemates).

Trenches and fire pits are visible through the actual excavation (trenches, pits, niches), and through the mound of earth in front of or behind them (parapet, parados). The firing positions are individual and for machine guns.

Trenches for groups of soldiers consist of a trench with parapet and parados, firing positions for riflemen, and servants of anti-tank grenade launchers, basic, and reserve firing platforms for the machine gun. The trenches for the machine gun group consist of basic and reserve firing platforms, rifle firing emplacements, trenches with parapets, and parados connecting them.

The location of the trenches and firing positions was made on the topographical peak, on the military ridge (on the slope), or at the foot of the slope. The layout of the trenches can be linear (Scurtu-Zurzugău, Bisticior), zig-zag (Zimbru Hill, Calul Hill, Obcioara, Păltineasa, Merezuri), winding (Unirea, Tășuleasa, Teiului Valley, Suhărzel, Scurtu-Zurzugău) or circular (Frumușeaa, Merezuri, Cucureasa) (Figure 7).



Figure 7 Zig-zag trench on the Zimbru-Piatra Fântânele Hill. (source: the author).

Bunkers and casemates are buried structures, built of reinforced concrete, with walls 1-1.5 m thick. A layer of soil was placed over them, giving them the appearance of domes, as can be seen in certain places (Ponce-Ilva Mică, Teiului Valley-Șant, Șendroaia Valley). They were destroyed in 1944, but their buried, and sub-aerial parts can be seen in the field, in some places being covered by grass, bushes, or forest. In some places, traces of masonry can be observed in their walls (Tihuța Canton, Teiului Valley), as well as steel beams for their consolidation (Tihuța Canton, Ponce-Ilva Mică, Șendroaia Valley) (Figure 9).



Figure 8 Concrete casemates at Tihuța Canton (Bîrgău Gorge, a), and Ponce Hill (Ilva Mică, b) (*source: the author*).

The "dragon's teeth"/anti-tank fangs were made of concrete, and are quite well preserved in relief, being partially destroyed and covered with grass, shrubs, and forest (Tihuța Canton, Șendroaia Valley) (Figure 9).



Figure 9 "Dragon`s teeth" at Tihuța Canton (Bîrgău Gorge) (*source: the author*).

The fortifications integrate into the agricultural, and forest landscape, and until now, there have been no cases of their destruction through deliberate anthropic actions, being accepted by the community as part of the history of these places.

A particular case of a bunker is the one at the confluence of Someșului Mare River with Valea Teiului River (Șanț Commune), this being arranged in a cave formed in Eocene limestone, at the base of a slope that comes into contact with the Someșului Mare meadow (Bîca, 2016) Within this bunker, pseudokarstification processes were observed, resulting in the formation of very interesting speleothems (stalactites, stalagmites).

4.3. The inventory, evaluation and tourism exploitation of fortifications of Arpad Line in Bistrița-Năsăud County

Concerning the inventory, evaluation and tourist exploitation of Arpad Line in Bistrița-Năsăud, the identification of the fortifications in the field was done through direct geomorphological observations, and by analyzing some aerial images. As relief forms, and as evidence of genistic works, the fortifications are characterized by geoarchaeological, historical, cultural-educational, touristic, and ecological relevance.

Geoarchaeological value refers to the existing material evidence (trenches, concrete constructions), and their relationships with the other components of the environment (soil, rock, relief, vegetation, population).

The historical value derives from the fact that the fortifications reconstruct the alignments that secured the eastern border of Hungary after the Second Vienna Award.

The cultural-educational value of the fortifications is given by several elements, such as:

- models of fortifications specific to the Second World War, in the mountainous terrain of the Eastern Carpathians;
- construction materials used;
- the position of the fortifications in the field depending on the relief and the access lanes;
- orientation of the fortifications towards the enemy's penetration directions.

The touristic value is supported by the fact that the fortifications are material attractions, which require facilities to be visited.

The ecological value of the fortifications refers to their reduced impact on the landscape.

Since these fortifications are located, for the most part, in the mountainous area of the county, they are associated as attractions with those specific to the mountain and can be used during mountain hikes or thematic excursions (Figure 10).



Figure 10 Group of students from the Faculty of Geography of Babeș-Bolyai University Cluj-Napoca during an application to identify the fortifications within the Arpad Line, at Teiului Valley (Șant Commune), (source: author).

At the European level, the fortifications of the Maginot, Siegfried, Mannerheim, Stalin, Metaxas, and Arpad lines have been partially restored and opened to visitors. Also, museums appeared in the vicinity of the fortifications (Abri Museum in Hatten-Alsace, Maginot Line Museum and Fort, Hunsbach, France; Siegfried Line Museum in Pirmasens, and Siegfried Line Museum "Hürtgenwald 1944 and in Peace" of Hürtgenwald-Vossenack from Germany; Stalin Line Museum in Minsk-Belarus; Fort Lisse Museum in Kato Nevrokopi –Greece, The Arpad Line Museum of Kolochava-Ukraine, and the Bunker of Arpad Line Museum of Verhnya Hrabivnytsya-Ukraine), and cultural-historical complexes (The Stalin Line historical and cultural complex from Minsk-Belarus) etc. (Figure 11).



Figure 11 The Stalin Line-Historical and Cultural Complex Promotion Panel. (source: <https://stalin-line.by/en/>).

In this context, specific forms of tourism have been developed, such as: remembrance tourism, compassionate tourism, cultural-historical tourism and military tourism. These forms of tourism include guided tours, visits to museums, forts, cemeteries and memorials, but also associated activities such as military vehicle raids, target shooting exercises with various weapons, children's playgrounds, caravan parks, etc.

The promotion of tourist attractions within the lines of fortifications is done via the Internet, on websites, blogs, and social media.

At the University of Helsinki, the World War II archaeological heritage valorization project called Mannerheim Line Archeology has been started, the aim of which is to map the current state of the Mannerheim Line fortifications and to recognize sites with good potential for archaeological research and cultural heritage conservation. Several sites on internet confirm these aspects:

- (<https://www.visit.alsace/en/heritage-and-history/memorial-sites/maginot-line/>;
- <https://blogs.helsinki.fi/mannerheim-line-archaeology/about-project/>;
- <https://stalin-line.by/en/>;
- [https://www.ekathimerini.com/leisure/destinations/1242206/tourism](https://www.ekathimerini.com/leisure/destinations/1242206/tourism;);
- [in-the-tunnels-of-war-on-greeces-northern-border/](https://www.in-the-tunnels-of-war-on-greeces-northern-border/); <https://lissepark.gr/>;
- <https://www.karpaty.info/en/uk/zk/kh/kolochava/museums/arpad/>;
- <https://www.karpaty.info/en/uk/zk/mk/v.hrabivnytsya/museums/>).

Regarding the flows of tourists visiting these fortifications, Maginot Line is the most popular and significant destination. According to L'Association des Amis de la Ligne Maginot d'Alsace, contacted on Facebook, the number of visitors to Fort Schoenenbourg in the year 2024 was 60,000 tourists. Visitors come mainly from Europe, particularly France, Germany and Great Britain, with significant interest in military history and educational groups.

Considering this way of valorizing the military heritage from the Second World War within the Maginot, Siegfried, Mannerheim, Stalin and Metaxas fortification systems, it is necessary that within the Arpad Line in Romania certain progress be made regarding the valorization of the fortifications.

On the territory of Romania, the fortifications within the Arpad Line are not expressly exploited, with the exception of Harghita county, where guided tours are organized to the fortifications present in the Ghimeșului Valley (<https://visitharghita.ro/en/places/the-arpad-line-in-the-eastern-carpathians-z6lwrimlctkdbg>). According to Carpathian Escapes Association from Miercurea Ciuc, in 2024 100 visitors were registered there. Otherwise, the fortifications are only targeted by the mountain trails in the areas where they are present. In Bistrița-Năsăud county, we can mention the trails on the Bistricior peak in the Călimani Mountains, the trails in the Bîrgău Mountains (Măgura Calului sector, Piatra Fântânele sector, Zimbroya Peak sector, Frumușeua sector, Tășuleasa sector, Măgura Corni sector, Munceii Înșirați sector), the Suhard Mountains (Omu Peak sector, Rotunda Pass, Suhard Pass), and the Rodnei Mountains (Beneș Peak sector). There are, however, some concerns about introducing these fortifications into the tourist circuits, such as the case of the thematic route set up in 2024 by the Tiha Bîrgăului Forest District, from the Valea Străjii Hut to a concrete casemate located in the nearby forest, and the case of the paved road built in 2024 by the Ilva Mică City Hall from Gura Strâmba sector to the bunkers complex on Ponce Hill.

Among the concrete actions necessary for the development of military and archaeological tourism on the Arpad Line, the following could be mentioned:

- raising the awareness of local authorities for the valorization of fortifications;
- cleaning the vegetation fortifications in wooded areas, to make them visible;
- the arrangement of thematic paths towards these fortifications;
- the placement of information panels, markings and indicators along the thematic routes and in the perimeter of the fortifications;
- the promotion of these thematic routes at the local, county and national level.

The actors involved in this process of development and capitalization of the fortifications would be the Bistrița-Năsăud County Council, the Bistrița-Năsăud Museum Complex, the Town Halls, and non-governmental organizations with tourism attributions.

5. Conclusion

Bistrița-Năsăud county has an important geoarchaeological heritage from the Second World War, in the form of fortifications within the Arpad Line defensive system, arranged on the peaks of the Călimani, Bîrgău, Suhard, and Rodna mountain units, but also in the Someșului Mare Hills, and Bistriței Hills.

This heritage is distinguished by scientific, historical, cultural-educational, and touristic values, and its management, and valorization depend on the interest shown by the authorities, and organizations with attributions in tourism towards these elements of the material heritage.

Based on them, two types of niche tourism can be developed, archaeological tourism and military tourism. The actors involved in this process are the Bistrita-Năsăud County Council, local Town Halls, non-governmental organizations with tourism attributions, and local tourism service providers.

The actions for the development, and tourism development of these fortifications would involve the placement of information panels in the localities, and in the vicinity of the fortifications, the development of access roads to the fortifications, the application of painted markings on the routes leading to the fortifications.

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