International
Whorkshop
Natural
Anthropic
Risk

University of Bucharest, Faculty of Geography and
Land Degradation and Geomorphological Dinamics Research Centre

International workshop

NATURAL AND ANTHROPIC RISKS

5th Edition

29 September - 1 October, 2023

Orșova Geographical Station

University of Bucharest, Faculty of Geography - Departement of Geomorphology,Pedology,Geomatics

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THE INTERNATIONAL WORKSHOP NATURAL AND ANTHROPIC RISK

29th of September – 01st of October 2023
Orșova, Romania

PROGRAMME
AND
ABSTRACT BOOK

2023

PROGRAM

Orșova, 29 Septembrie – 01 Octombrie 2023

Vineri, 29 Septembrie 2023 – Stațiunea geografică Orșova

17:00-20:00 – Primirea și înregistrarea participanților

. . .

Sâmbătă, 30 Septembrie 2023

08:00 – 08:30 – Înregistrarea participanților/pauză de cafea
08:30 – 08:45 – Deschidera simpozionului. Cuvânt de deschidere – Sala de Conferințe ”Stațiunea Geografică Orșova”
09:30 – 14:00 – Comunicări pe secțiuni
14:00 – 16:00 – Masa de prânz
16:00 – 18:00 – Sesiune de postere

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Duminică, 01 Octombrie 2023

08:30 – 09:00 – Pauza de cafea
09:00 – 17:00 – Aplicație de teren
16.00 – Încheierea simpozionului și plecarea participanților

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16:30 – 18:00 – **Sesiune de postere**

ABSTRACT BOOK

Contents

Ravine and gully erosion susceptibility as an integrated component of mountain hiking trails analysis. 7 Stairs Canyon Case Study

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Abstract

The hydrodynamic erosion of slope is one of the geomorphic procceses that occurs most frequently in mountainous regions. It can pose as a hazard process to tourist infrastructure as hiking trails as well as to all types of tourist outdoor activities as well as on hiking trails and other outdoor tourist activities. This process is commonly related with land degradation, human activity, heavy rainfall as trigger conditions and lithological and morphometric characteristics as pre-conditional factors. Ravine and gully erosion can affect even the protected areas where uncontrolled tourism can occur.

The study area is the 7 Stairs Canyon trails from Piatra Mare Massif, a protected area where outdoor recreational activities take place (such as hiking, nature walks, backpacking trips, and mountain biking). The number of people hiking 7 Stairs Canyon trail rise over past years more than 1000 daily due to the summer season. In the same time, the hydrodynamic erosion of slope is more frequently due to this season and the vulnerability of tourists and trails as a tourist resource is higher. However, the slope is susceptible to various hydrodynamic geomorphic processes among which the ravine and gully erosion is point out due to high values of degrees of landform fragmentation (1.5-3.5 km/km2, and 50-180 m/km2, respectively).

Therefore, modeling the susceptibility of the mountain environment to this geomorphic process and the effects at the level of tourist trails can provide valuable data on both, the resilient and safe areas for the management of recreational activities and spaces for recreational purposes, as well as areas vulnerable to hydrodynamic slope processes.

This study aims were to inventory and map the ravines and gullies along the tourist trail, to identify the areas that are susceptible to ravening related to the tourist activities and to conduct a qualitative assessment of the sensitivity of tourist landscape. The variables of the susceptibility analysis were chosen as pre-conditions and triggering factors of ravine and gully erosion, related to the main features of the hiking trail, and their assessment was based on GIS techniques.

The findings of this study highlitgh that the susceptibility values are higher on the peripheric sides of the Piatra Mare massif, given that the impact of human activities is greater mainly on the periphery of the massif. Maximum values are recorded in the destination area of the hiking trail, decreasing toward the center of the massif, indicating a non-linear relationship with land degradation but a linear relationship with morphometric factors. Due to the configuration of the valley bottom, the vulnerability values of the tourist trail are medium - low for roughly 70% of its length, but it increases to its highest level in the canyon sectors and narrowing of the valley bottom, where the vulnerability is higher. It's important to be aware of the potential consequences of ravine and gully erosion and

take appropriate measures to mitigate its effects. In protected areas where the number of tourists is increasing.

Key words: Ravines, Susceptibility, Outdoor tourism activities.

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Particularități ale inundațiilor în Câmpia Boianului

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Rezumat

Câmpia Boianului ocupă partea vestică a Sectorului Olt – Argeș sau Sectorului Central al Câmpiei Române, cunoscut în trecut și sub denumirea de Câmpia Teleormanului (Posea și Badea, 1984). Bazinul hidrografic Călmățuiul Teleormănean dreneză o mare parte a acestei câmpii, fiind un bazin autohton, dezvoltat în totalitate în Câmpia Boianului.

Câmpurile interfluviale au rezultat în era cuaternară, în urma depunerilor cu origine fluvio-deltaică, care s-a făcut din trei părți (vest, nord și sud), cu intensitate variabilă în timp. Mișcările neotectonice nord-bulgare influențat aspectul reliefului și au dus la apariția unor rupturi de pantă. Astfel, depresiunea Alexandria a funcționat multă vreme ca nivel de bază pentru râurile din Carpați., iar mișcările neotectonice nord – bulgare au influențat apariția in relieful major a patru rupturi de pantă, identificate pe linia următoarelor localități:

1) Mozăceni – Izvoru
2) Vânători – Gratia – Merișani –Coteana;
3) Clejani –Videle – Olteni – Roșiori de Vede – Sprâncenata;
4) Valea Câlnișteі –Schitu – Poienari –Alexandria – Bogdana – Uda (Grecu Florina, 2010).

Scurgerea apei râului în bazinul Călmăţui poartă amprenta influenţei factorilor fizico-geografici şi antropici din arealul său rolul determinant îl deţinându-l condiţiile climatice. Astfel, alimentarea râurilor este predominat superficială de origine nivo-pluvială (până la 85%), iar sursele subterane deţin ponderi reduse (15 – 25%) (Ujvári, 1972). În condițiile unui climat caracterizat prin precipitaţii reduse, scurgerea medie prezintă valori scăzute aceasta fiind la nivelul bazinului de 1,1 l/s.km2 (Atlas R.S. Romania, 1974).

Cu toate că debitele râurilor din cadrul bazinului Călmăţui se caracterizează în general prin debite scăzute (Q mediu al râului Călmăţui la postul hidrometric Crângu este de numai 1-1,3 m3/s, iar al râului Urlui la postul hidrometric Furculeşti de 0,5-0,6 m3/s), au existat totuşi situaţii în decursul timpului, când precipitaţiile excepţionale au determinat creşteri deosebite ale debitelor şi ieşirea apelor din matcă, accelerând procesele de eroziune şi acumulare şi producând pierderi în sectorul agricol, pagube materiale (detreriorarea infrastructurii de comunicaţii din zonele joase de luncă) şi chiar pierderi de vieţi omeneşti.

Pentru a evidenţia pericolul pe care îl reprezintă viiturile şi implicit inundaţiile s-a analizat frecvenţa depăşirii debitelor de atenţie, de inundaţie şi de pericol:

Tabelul nr.1 – Frecvanţa depăşirii debitului de atenţie, inundaţie şi pericol (1970-2009)

Nr. crt.	Râul	Postul hidrometric	Debit de Atentie (m^3/s)	Nr. depăşiri QA	Debit de Inundaţie (m^3/s)	Nr. depăşiri QI	Debit de Pericol (m^3/s)	Număr depăşiri QP
1	Călmăţui	Crângu	3,80	39	9,98	21	42,00	2
2	Urlui	Furculeşti	3,50	5	8,50	1	16,00	1

Sursă date I.N.H.G.A.

Analizând aceste date, observăm cu uşurinţă frecvenţa mai mare a depăşirii cotelor de atenţie şi de inundaţie în cazul Călmăţuiului faţă de Urlui. Acest fapt este cauzat de lungimea mai mare a Călmăţuiului (142 km) faţă de cea a Urluiului (64 km), cât şi „salbei" de iazuri construite în lungul Urluiului, care pot prelua o mare cantitate de apă. Astfel putem spune că riscul de inundaţii este mai mare în cazul localităţilor situate în lungul Călmăţuiului decât în cazul celor situate pe valea Urluiului. În vederea diminuării acestui risc, în vara anului 2011, au fost executate lucrări de decolmatare a albiei râului Călmăţui şi de îndiguire în cursul mijlociu şi inferior al acestuia, iar la nivelul bazinului analizat putem aprecia că vulnerabilitatea la inundaţii este redusă.

Cuvinte cheie: inundații, scurgerea apei, câmpuri

The impact of extreme weather phenomena on the vulnerability of a city's infrastructure

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Abstract

The main impact of climate change on urban areas, infrastructure and construction is mainly related to the effects of extreme weather events, such as heat waves or droughts, heavy rainfall or snow, storms, floods, increased slope instability.

The study is based on the analysis of meteorological statistical data from Drobeta Turnu Severin Station, but also on statistical data that reflect the direct impact - human losses, affected people and material damage - related to extreme weather conditions. From the results of the study carried out at the meteorological station, it was found that for the entire period of observations and measurements, the tendency is one of increasing of the average annual temperature, and a reduction of precipitation. Moreover, we anticipate that the climate in this region will be characterized by a substantial extension of the warm period of the year. It is expected that these disturbances in the climate system will cause a significant increase in the frequency of extreme weather events, such as heat waves, floods, strong winds, storms, droughts, etc.

The municipality of Orsova aims to take appropriate measures to address the planning and management practices of long-term urban space and design an appropriate infrastructure that plays an important role in minimizing the impact of climate change and reducing the risk to the human environment. In the face of these threats, given by extreme meteorological phenomena, it also aims to identify and assess the city's vulnerability to the effects of climate

Key words: extreme weather phenomena, climate change, vulnerability, Orsova

Gully erosion processes and their management in the Trivale Forest Park, Pitești city, Romania

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Rezumat

The purpose of this study is to analyze gully erosion processes and their management in the Trivale Forest Park. The objectives of the study follow, on the one hand, the assessment of the areas prone to erosion and, on the other hand, the spatial susceptibility mapping, by using GIS and the frequency ratio (FR) techniques. Establishing the kind of impact of the erosion control measures and hydrotechnical structures on the stability of erosional landforms was carried out both through field observations and cartographic overlays. The results of the multifactor analysis highlighted, in a good agreement with the field observations, the areas most susceptible to slope erosion processes.

For assessing the susceptibility of an area to the formation of gully erosion processes, GIS methods are widely employed. Over time, different parameters were taken into account from one author to another (i.e. Conforti et al., 2011, used 8 parameters, while Mohammady and Davudirad, 2023, used 12 parameters), which led to the emergence of multicriteria analyzes to determine the risk of gully erosion.

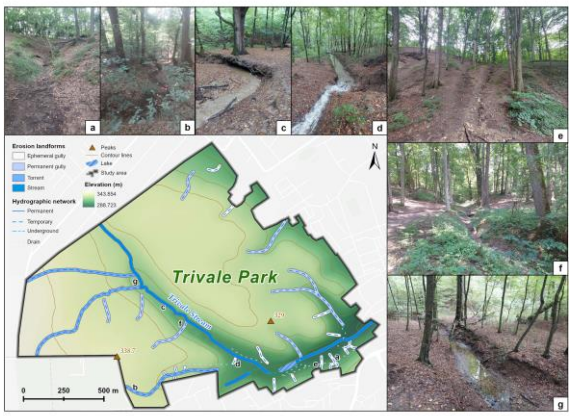

Figure 1. The main landforms of gully erosion in Trivale Forest-Park

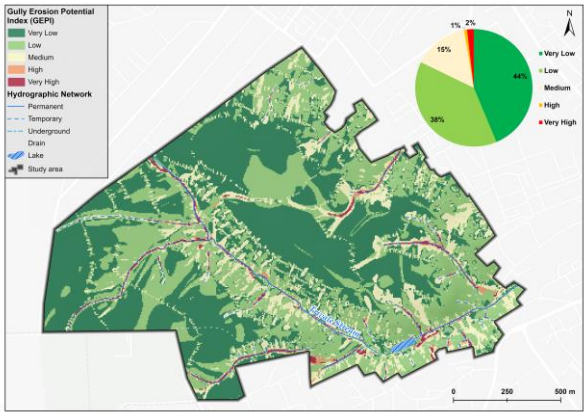

Figure 2. The GEPI map in Trivale Forest-Park

In order to find the weights of each factor influencing the analyzed processes, some authors used semi-automatic methods, such as Automated Hierarchy Process (AHP) (Igwe et al., 2020) or statistical methods, like Frequency Ratio (FR) (Razavi-Termeh, Sadeghi-Niaraki and Soo-Mi Choi, 2020; Oliver, Van De Wiel and de Clercq, 2023). The latter methodological approach (widely known as the FR model) looks at the spatial relationship between the inventory of the envisaged natural hazard (dependent factor) and its triggers (independent factors) through a bivariate statistical analysis.

According to the Gully Erosion Potential Index Map (Figure 2), the susceptibility to gully erosion of the Trivale Forest Park falls in the Low (38%) and Very Low (44%) classes, for a major part of the area. However, there are some hotspots with High (1%) and Very High (2%) erosion potential, located along the main hydrographic and torrential network, due to the added effect of the flash-floods causing soil erosion during storm events. The Medium erosion potential areas (15%) are located in the northeastern part of the forest, a transitional area between the third and fourth terraces of the Argeș River. The 100 validation points showed an accuracy of almost 92% for the data obtained.

Although gully erosion areas are significantly reduced, the process is intense in some parts of the hillslopes, which eventually led to the implementation of a number of structural management measures to reduce their impact. Among them, we list the canalization of more than half of the length of the Trivale Stream, but also of other permanent gullies in the studied area, the installation of weirs and dams, as well as the construction of drains along the main streets along the river network.

In this study, modern methods were used to evaluate the susceptibility to erosion processes on the interfluvial surfaces within the Trivale Forest, on the outskirts of the city of Pitesti, Romania. The methods used consisted of field observations and measurements of the forms of erosion, their classification according to their permanent or temporary character, as well as according to their dimensions, taking into account the existence of anti-erosion or hydrotechnical measures. The GIS analysis, combined with the Frequency Ratio statistical model, provided good results (with an accuracy of over 90%), which attests to the agreement between the relative weight of the determining factors of the erosion processes and the current risk found in the field validation stage.

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Geomorphological decision-making tool for territorial planning and improving transport conditions

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Abstract

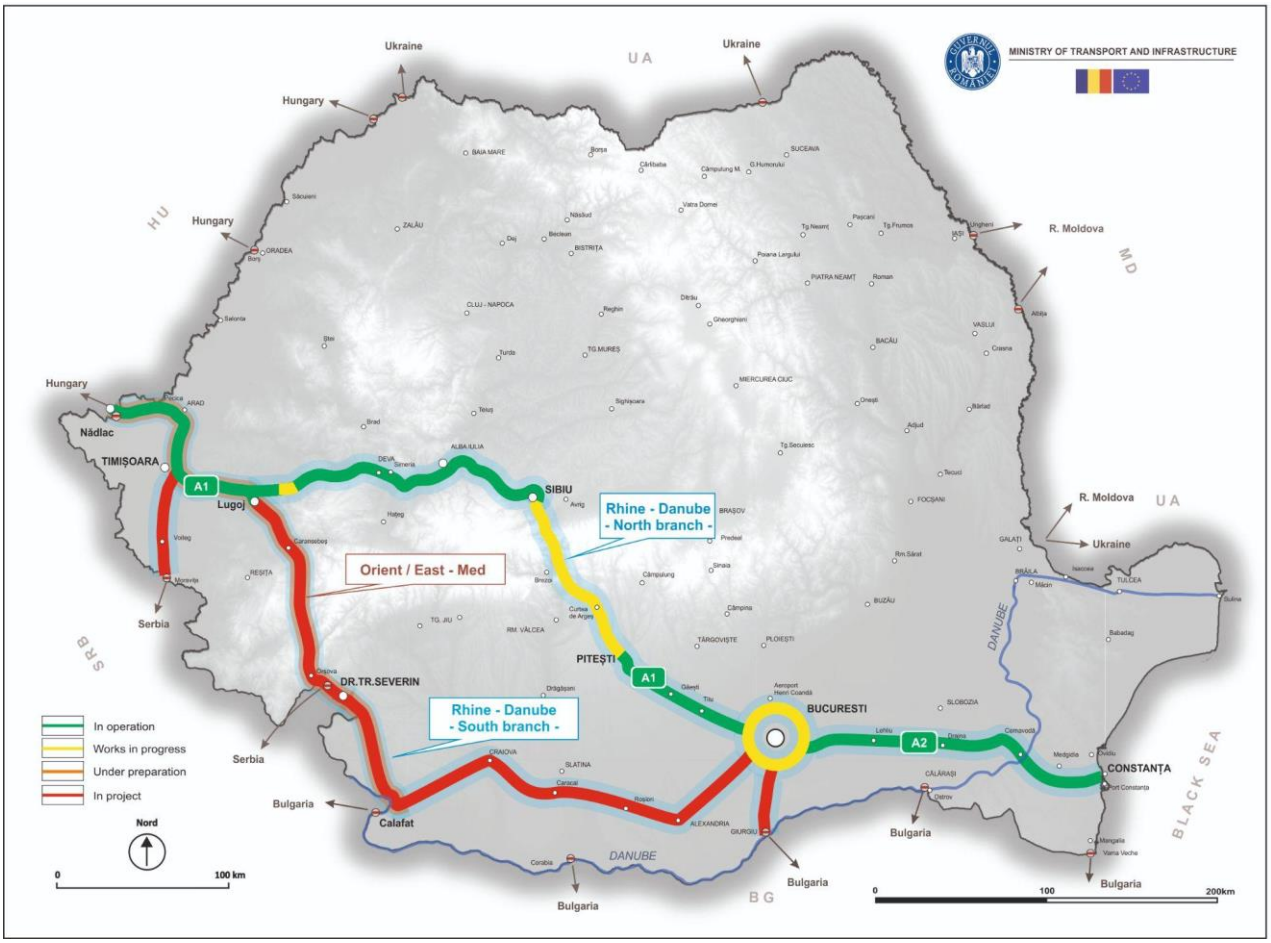
The project consists in developing and implementing a decision-making tool used for identifying solutions. These solutions aim at improving the transport conditions and reduce the negative environmental impact along the Romanian sectors of Rhine-Danube and Orient / East-Med road Corridors, a total length of 1603 km.

The decision-making tool will be made using a variety of GIS and modern digital techniques and methods for developing and applying complex and innovative multicriteria analyses.

The decision-making tool will be used for: identification and representation of the favorable areas for installing EV charging stations (including secured parking lots), identification and representation of the favorable areas for emplacing the forest belts along the road for safety and environmental reasons, and identification and representation of the favorable areas for mounting sound-absorbing panels for the settlements and natural protected areas affected by road noise.

The study will be achieved by following two situations, based on the status of the high-speed road network on the eligible TEN-T Core Corridors in Romania (Rhine-Danube and Orient / East-Med). The first type of analysis will be applied on the motorway network already in use or currently under construction, with defined routes with a total length of 971 km (with a percentage of 61% of the network). The second type of analysis will focus on the motorway sectors in the project phase with a total length of 631 km (39% of the network), which will use the predefined alignments at the level of the Ministry of Transport and Infrastructure, as a result of the favorability analyses.

The results of the study contained in the Final Report of the Action will be assumed by the Ministry of Transport and Infrastructure and will become part of the documentation of the specifications for implementing solutions in order to improve transport conditions and to reduce environmental impact on Romanian TEN-T Core road corridors.



Key words: EV motorways, charging stations, forest belts, sound-absorbing panels

La variété des paysages- effet de la synergie des éléments environnementaux

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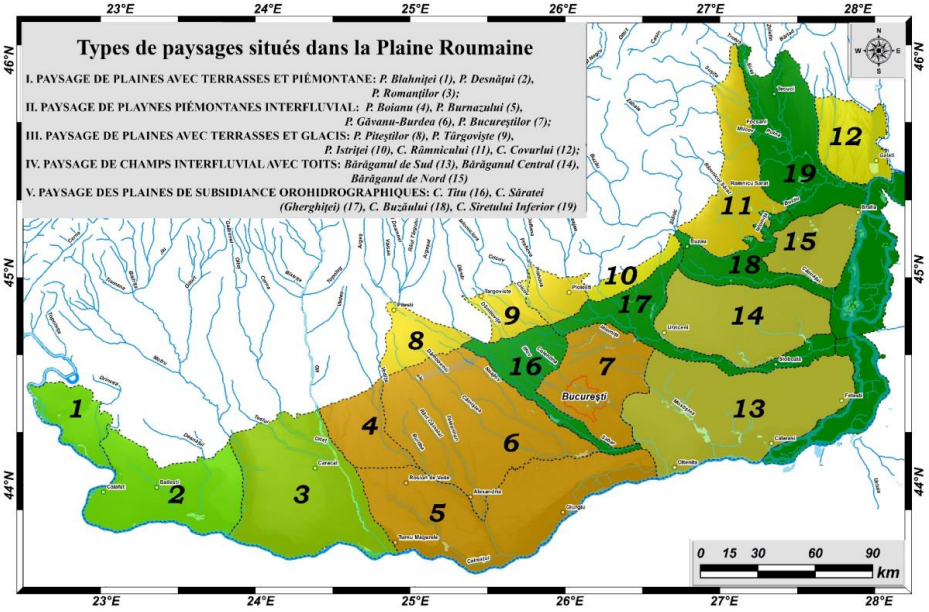
Abstract

The paper brings into question and proves that: 1) plain units, although seemingly homogeneous and insignificant for geomorphology, are units in which the geographical / geomorphological landscape is varied; 2) the variety of landscapes is the result of synergistic interconnections between environmental elements. An important role in the genesis of major landforms belongs to the geological and paleogeographical evolution, to the surface formations from which the landscapes of order 1 result. On this structure of the major landforms, the climate, water and biopedogeographical elements resulted in landscapes of orders 2 and 3 acted synergistically; 3) human society has modified through its actions the functions of the environment, creating anthropogenic landscapes, the most important being the agricultural landscapes (Grecu et al.,2023).

This design is applied in the study of the Romanian Plain, a lake-fluvial plain located in the Carpatho-Balkan Depression in which it holds over 90% from the plain located on either side of the Danube River. In this sense, both C R and the lower order landscapes (2.3) are synergistic landscapes. A synergistic unit is defined as an area resulting from specific interconnections of landscape/environment elements with its own characteristics, distinct from other units. A change in one of the synergistic components can produce new characteristics, leading to the transformation into a new synergistic unit.



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Combining analytic hierarchy process with GIS to assess the Urban Vulnerability to Flooding "The Case Study of El Bayadh City, Algeria"

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Department of Urban Engineering, University of M'sila, Algeria

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Abstract

Urban vulnerabilities must be studied and assessed to make cities more resilient to floods. The main objective of this study was to test a methodology, based on multi criteria analysis and geographic information systems, aimed at assessment the urban vulnerability of El Bayadh city, located in the west of Algeria, to floods and to identify flood-prone areas. To succeed, a geographic information system (GIS) was combined with an analytical hierarchy process (AHP) in order to analyze several criteria, such as population density, housing typology, type of equipment, and road network to measure the overall fragility of the study area. The analytical hierarchy process (AHP) was applied to determine the weights on each criterion. To assess the urban vulnerability, a simple additive weighting method was used. Each criterion was evaluated with the aid of AHP and mapped by GIS. The most important results were: 5.6% of the study area had an extreme vulnerability, 7.97% high vulnerability, 8.5% medium vulnerability, and 77.87% low vulnerability. The results of this study can be used as a tool to assist local authorities during decision-making regarding flood danger assessment.

Key words: Flood, vulnerability, hierarchical multi-criteria analysis (AHP), geographic information system (GIS), El Bayadh.

Suivi par l'imagerie Radar SAR de la dynamique des îlots du Danube, secteur Drobeta Turnu Severin-Vedea (Roumanie)

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Abstract

Le Danube traverse les principales unités de relief de l'Europe dans une direction longitudinale, étant dépendant dans sa genèse et son évolution de structures géologiques et tectoniques majeures. La stratification des Carpates a eu une influence directe sur la dynamique du Danube inférieur. Les grandes rivières, Jiu, Olt et Argeş, affluents du Danube, peuvent impacter, directement ou indirectement, la dynamique des îlots suite aux phénomènes météorologiques extrêmes, intensifiés par diverses activités humaines le long du fleuve. L'objectif de ce travail consiste à suivre la dynamique des îlots du Danube inférieur dans le secteur Drobeta Turnu Severin-Vedea de longueur 445 km. Grâce aux images radar SAR acquises à différentes dates, nous avons pu extraire 86 îlots/sous-îlots en 1992 d'une superficie totale de 154,29 km^2 et 74 îlots/sous-îlots en 2022 avec une superficie globale de 147,63 km^2. Ces résultats mettent en évidence la disparition de 12 îlots et/ou sous-îlots sur une période de 30 ans. Cette évolution des îlots sur un temps court, peut s'expliquer par les inondations fréquentes dans la région, accentuées par les facteurs anthropiques comme les barrages Iron Gates I et II qui perturbent ainsi la dynamique naturelle du système des îlots en déréglant et en augmentant le débit de base, en altérant les processus d'érosion et de sédimentation, etc.

Mots-Clés: Danube, Dynamique, Îlots, Inondations, Radar SAR, Roumanie, Severin, Vedea.

Géogouvernance : plaidoyer pour une résilience des territoires face aux risques majeurs

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Abstract

La participation sociale et citoyenne est considérée aujourd'hui comme un incontournable et un passage obligé pour tous les gestionnaires de l'espace. Puis la résilience des territoires. Plusieurs facteurs peuvent expliquer ce qu'on peut appeler « impératif participatif », ou bien « le devoir de concertation » comme le niveau d'instruction plus élevé des acteurs, leur plus grande facilité d'accès à l'information grâce aux (NTIC) nouvelles technologies de l'information et communication et une prise de conscience accrue de leurs droits et responsabilités. « Les territoires sont de plus en plus vulnérables… le coût des catastrophes a été multiplié par 5 en 15 ans ». Nous vivons dans un contexte de crises systémiques et d'incertitude : avec le dérèglement climatique, la raréfaction des ressources, l'extinction de la biodiversité, la pollution, la mondialisation ou encore les crises économiques, les territoires sont amenés à subir de nombreux dérèglements au cours des années à venir : "La résilience territoriale s'impose alors comme le moyen de dépasser les situations de crise et d'engager les territoires dans une vision à plus long terme qui intègre le risque et s'appuie sur les forces et les potentialités locales".

La démarche présentée ici s'inspire du concept de géogouvernance dans son aspect social et solidaire, donc, qui vise la promotion et l'émergence d'initiatives locales par l'accompagnement des acteurs et par la formation et le financement d'activités. Nous avons adopté une méthode d'analyse conceptuelle et pratique pour présenter une expérience réalisée en Algérie.

La conception de la géogouvernance telle qu'elle a été présentée dans cet article, a toujours besoin d'un protocole de référence propre à son processus. Elle doit aussi, s'accompagner d'un principe de formation et information des acteurs, directe ou indirecte, afin de leur permettre d'acquérir les compétences nécessaires à la compréhension des connaissances et à l'appréhension des méthodes et outils catalyseurs de l'information territoriale, à savoir, l'appartenance, l'identification et la réappropriation de l'espace pour la co-construction la résilience et d'aménagement commun du territoire.

Mots Clé: Géogouvernance, Participation sociale, Acteurs, Gestion territoriale, Aménagement.

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Prédiction du risque d'érosion hydrique à l'aide de la méthode RUSLE dans la région de Boussaâda - Algérie

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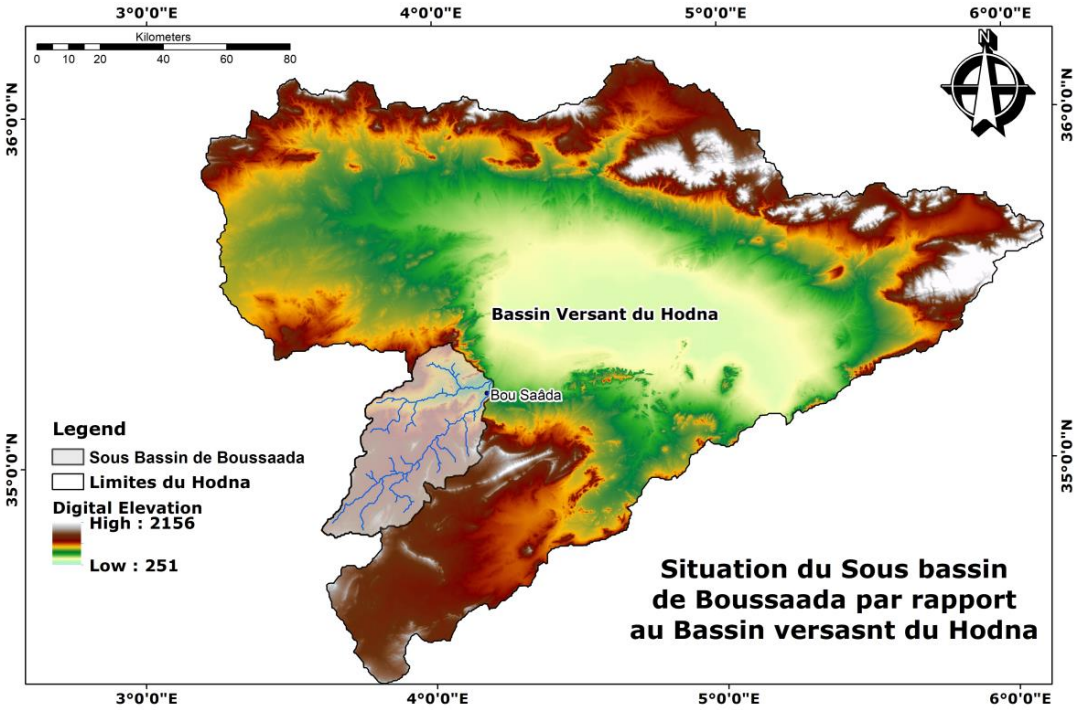
Abstract

Le territoire algérien est prône à diverses dégradations écologiques surtout dans les régions steppiques avec plus de 30 millions d'hectares de terres menacés par l'érosion hydrique qui représente un risque environnementale et sociale majeur.

Dans cette étude nous allons présenter une application de la Méthode RUSLE (Revised Universal Soil Loss Equation) pour cartographier et quantifier l'aléa de l'érosion hydrique dans la région semi-aride de Boussaâda qui est marquer par des risques d'inondation, de désertification et d'ensablement, cette région fait partie du bassin versant du Hodna. Ses résultats vont nous permettre de définir les zones vulnérables et nous procurer un outil d'aide à la prise de décision et d'action pour lutter contre l'érosion.



Mots Clé: RUSLE, Hodna, Boussaâda, SIG

Identification of road infrastructure development alternatives by using applied geomorphology. Case study: Dobrogea Road Intercorridor

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Abstract

The aim of the study is to identify the ideal surfaces for the construction and development of road infrastructure through the use of applied geomorphology, respectively a multicriteria analysis was applied with the help of geomorphology and Geographic Information Systems to study the geodynamic factors. The result was the design of the suitability map, which indicates the areas suitable for the development of a road network. The methodology led to the identification of development alternatives by comparing the quantitative data extracted through a useful tool, which helps in identifying and establishing restrictive and favorable areas for the development of a road link. This tool is based on a multi-criteria analysis for the aggregation of natural and anthropogenic factors, respectively, Geographic Information Systems were used for the processing of vector and raster data, which were reclassified for the homogeneity of the database. The quantitative data extracted following the multicriteria analysis were processed and analyzed representing the decision-making tool regarding the alternatives proposed for the development of the road network at the level of the Dobrogea Road Intercorridor.

Key words: infrastructure, geomorphology, Dobrogea, GIS

Digital tools for the construction sector BIM and GIS

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Abstract

The paper deals with aspects of the digitization of the construction sector, specifically by detailing the process of adopting the Building Information Modeling (BIM) concept in Romania, in comparison with other European countries. It is based on the data obtained from specialised publications, while also integrating information about the legislative changes proposed for the adoption of BIM. Countries such as Germany, France, or Italy have taken concrete steps regarding the digitization of the construction sector by imposing the use of BIM especially in the projects financed through public funds. In this context, Romania relies on the reforms included in the National Recovery and Resilience Plan and their irreversibility to speed up the digitization of the construction sector.

In order to highlight examples of good practice, references were made to the integration of Geographic Information System (GIS) in cartography and in areas of public administration in Romania, as a component of digitization. Finally, the paper proposes a theme for a transport infrastructure project that will exclusively use digital techniques for the foundation, design, construction and monitoring of the stages related to the investment objective by combining the two tools: BIM and GIS.

Key words: constructions, digitization, Building Information Modelling, Geographic Information System, transport infrastructure

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Măsuri de prevenire a impactului dinamicii albiei asupra infrastructurii de transport. Studiu de caz: râul Prahova, sectorul Breaza - Posada

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Abstract

Scopul lucrării este reprezentat de dorința de a analiza în detaliu impactul pe care dinamica organismelor hidrologice îl are asupra rețelei de infrastructură. Abordarea aleasă pentru identificarea proceselor ce pot pune în pericol desfășurarea procesului de transport, atât feroviar cât și rutier, este una practică, care a presupus măsurători detaliate în teren pentru a obține date cât mai actuale, care corespund cu realitatea din teren.

Crearea unui context favorabil pentru dezvoltarea și optimizarea transporturilor, dar și implementarea unei metodologii practice în analiza proceselor geomorfologice ce se desfășoară în perimetrul unui organism hidrologic sau sunt declanșate de acesta, reprezintă teme actuale, cu impact asupra societății. Analizele care implică procese active, cu o frecvență ridicată, care pot avea efecte imediate asupra elementelor antropice și naturale, necesită analize și observații din teren pentru a putea cuantifica dimensiunile și impactul acestora. Astfel, această analiză este realizată în conformitate cu idealurile și viziunea personală și care se încadrează în normele științifice de cercetare modernă.

Pentru identificarea potențialelor riscuri pe care dinamica albiei râului Prahova îl exercită asupra infrastructurii de transport din cadrul sectorului delimitat între localitățile Breaza și Posada, s-au efectuat o serie de măsurători în teren, urmate de interpretarea datelor prelevate, utilizând o serie de analize statistice și intepretări cartografice prin intermediul Sistemelor Informatice Geografice (SIG/GIS). Pe lângă datele prelevate în etapa de teren, au fost utilizate și alte baze de date din diverse surse, cumpuse din date de tipul raster și vector.

Alte aspecte analizate sunt reprezentate de caracteristicile geografice din cadrul arealului de studiu. În acest sens, în cadrul analizei nu au fost neglijate elemente naturale și antropice care influențează semnificativ evoluția în timp a unui râu.

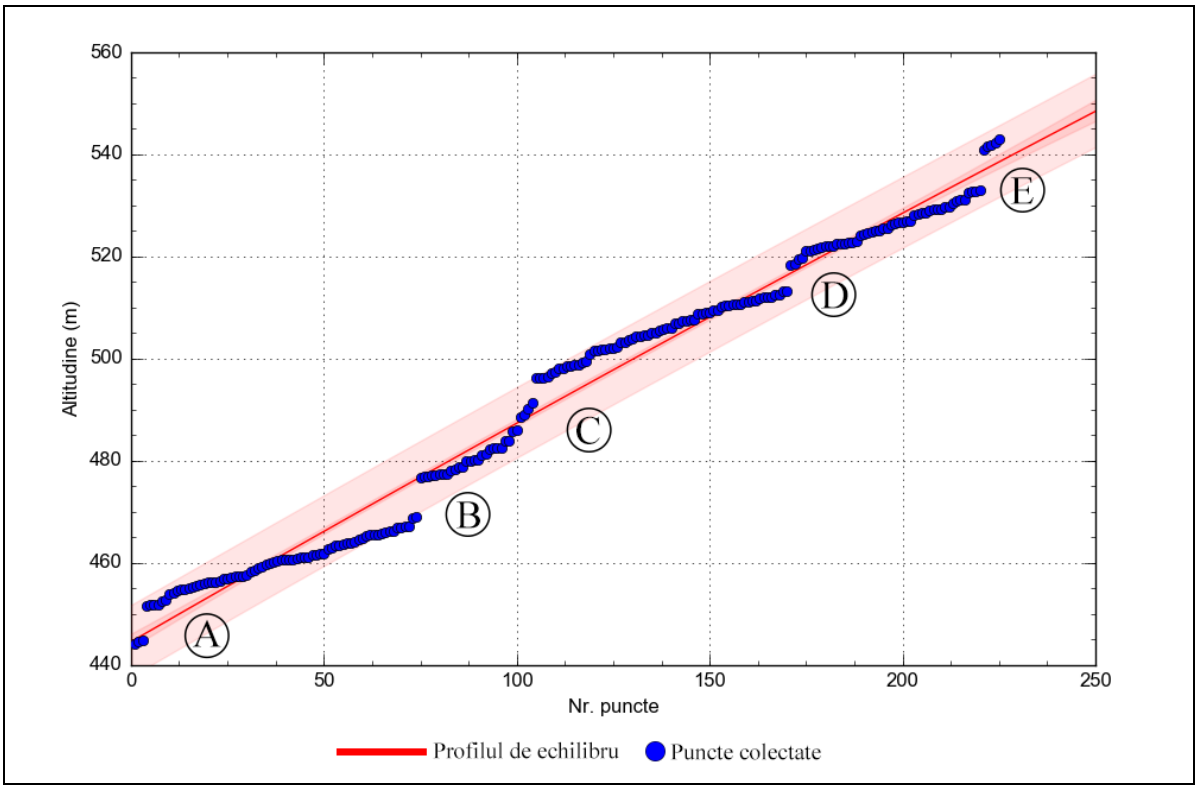

Figura 1. **Cotele râului Prahova raportate la profilul de echilibru**
Sursă: Proprie. Grafic prelucrat în programul CurveExpert Professional

Nr. Crt.	Denumire	Diferență de nivel	Lungime
1	Pragul A	6.75 m	25 m
2	Pragul B	7.68 m	40 m
3	Pragul C	4.88 m	95 m
4	Pragul D	5.04 m	10 m
5	Pragul E	8.07 m	125 m

Tabel 1. Principalele succesiuni de praguri și dimensiunile acestora

Cuvinte cheie: dinamica albiei, Prahova, infrastructura de transport.

Transformări ale activității turistice în zona Cazanelor Dunării

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Rezumat

Pe fondul schimbărilor permanente care caracterizează societatea actuală, a diversificării ocupațiilor, a creșterii bunăstării, a creșterii timpului liber, a creșterii interesului pentru protejarea mediului și pentru păstrarea moștenirii culturale, a interesului oamenilor pentru noi experiențe și provocări, a creșterii experienței turistice, putem remarca, în zona studiată, o creștere a consumului de activități turistice reflectate prin creșterea numărului de structuri de primire turistice și o diversificare a acestora, o creștere a numărului structurilor de alimentație, agrement și divertisment, o creștere a numărului sosirilor și înnoptărilor turiștilor. Îmbunătățirea infrastructurii tehnico-edilitare a așezărilor, a transporturilor, îmbunătățirea calității infrastructurii turistice de cazare și agrement, promovarea potențialului turistic al Defileului Dunării au generat o creștere a atractivității regiunii ce a avut impact asupra economiilor locale (comerț, construcții, transporturi, alimentație public, industrie mică și artizanat) și a creării de noi locuri de muncă. În ultimii ani s-au făcut eforturi deosebite pentru crearea, dezvoltarea și modernizarea infrastructurilor specifice pentru valorificarea durabilă a resurselor naturale, culturale și pentru creșterea calității serviciilor turistice prin amenajarea unor obiective turistice naturale cu potențial turistic (peștera Ponicova), prin amenajarea căilor de acces, marcarea traseelor turistice, instalarea de panouri informative, puncte de belvedere, puncte de informare turistică (centrul de informare turistică Orșova),varietatea manifestărilor cultural artistice naționale și internaționale (Eibenthal-Czech Village in Romania, Festivalul berii Eibenthal, Festivalul Banat de la Eibenthal, evenimentul Punțile prieteniei România-Serbia de la Eșelnița, Zilele Orșovei, Nedeia de la Eșelnița, *Consum produse locale-comuna Dubova - pensiunea Vent-Vela), construirea de noi structuri de primire turistică și modernizarea celor existente, antrenarea comunităţilor locale în activităţi de ecologizare şi conservare a mediului natural, cointeresarea lor directă în protejarea monumentelor şi siturilor cu valoare istorică sau de patrimoniu cultural. Numărul sosirilor a crescut în arealul studiat de la 4576 sosiri în anul 2001 la 31342 în anul 2021, iar numărul înnoptărilor de la 8375 în anul 2001 la 62786 înnoptări în anul 2021. Pandemia covid 19 a lăsat urme în numărul sosirilor și înnoptărilor turistilor astfel că dacă la nivelul anului 2019 numărul sosirilor era de 35971 în anul 2020 a scăzut la 30921 după care se înregistrează creștere până în prezent, iar numărul înnoptărilor la nivelul anului 2019 a fost de 67054 și a scăzut în anul 2020 la 63243 înnoptări. După anul 2000 se remarcă o creștere a numărului sosirilor. Aceste măsuri nu sunt suficiente întrucât în continuare durata sejurului turistilor este scurtă, de weekend, numeroși turiști doar tranzitează zona, asftel că sunt necesare în continuare măsuri privind: diversificarea activităților turistice, protejarea și conservarea întregului patrimoniu natural și cultural, pregătirea și asigurarea unor servicii turistice de calitate deosebită, respectarea modului de viață al populațiilor autohtone (multietnice), modul de concepere a produsului/produselor turistice, de proiectare a acțiunilor promoționale să țină cont de particularitățile resurselor turistice naturale, culturale, astfel încât evoluția turismului, dar și satisfacțiile turiștilor să înregistreze un trend pozitiv în condițiile păstrării identității locale si culturale specifice.

Cuvinte cheie: îmbunătățirea calității infrastructurii turistice, identitate locală, trend ascendent al circulației turistice, conservarea patrimoniului turistic, promovare.

Determinarea dinamicii versanților prin analiza morfometrică și morfografică a reliefului, utilizând tehnici GIS. Studiu de caz: zona Subcarpaților Dâmboviței și Prahovei (Subcarpații Curburii)

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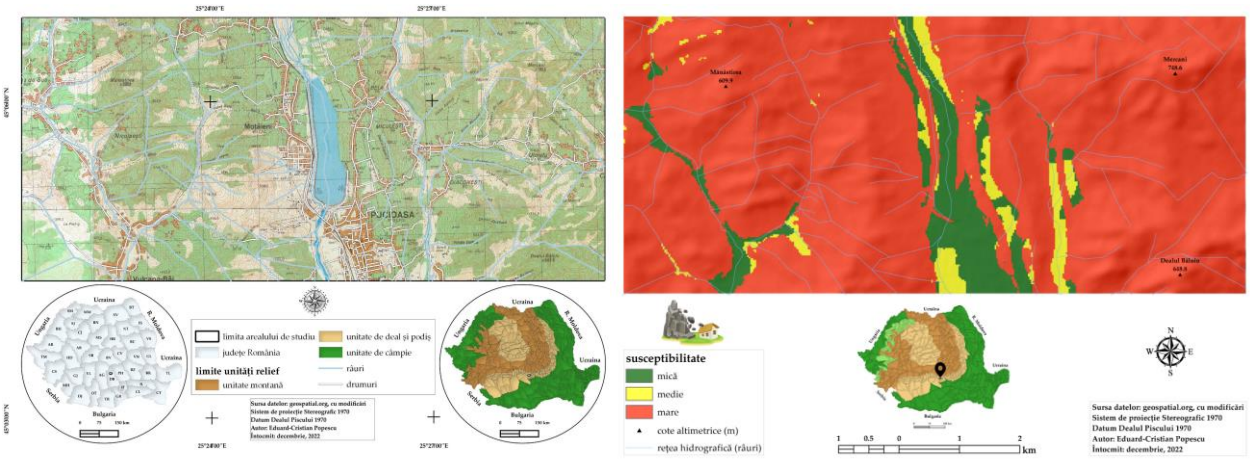
Rezumat

Pentru a înțelege necesitatea practicării analizelor geografice spațiale și terestre este necesară descifrarea trecutului prin studiul materialelor bibliografice și cartografice. Relevanța lucrării are la bază conștientizarea importanței tehnicilor GIS applicate. Originalitatea acestui studiu este evidențiată de combinația și corelarea statisticilor, inclusiv a metodelor de corelare și regresie, care au ca scop principal calculul și simplificarea concluziilor, știind că este foarte dificil de cuantificat multitudinea tuturor factorilor care influențează un anumit fenomen.

Scopul studiului are la bază determinarea dinamicii versanţilor în zona Subcarpaților Dâmboviței și Prahovei, în proximitatea unităților administrativ-teritoriale Pucioasa, Moțăieni prin analiza morfometrică şi morfografică a reliefului, utilizând tehnici GIS. Acest scop a fost formulat plecând de la supoziția că în arealul de studiu se identifică condiţii pentru declanşarea unor procese geomorfologice care pot afecta omul şi activităţile sale. Această temă prezintă interes și dorință de cercetare, de analiză, întrucât este de maximă importanță controlul permanent al proceselor geomorfologice care pot afecta activitățile socio-economice ale omului, precum și nevoia societății de a se pregăti în mod corespunzător în vederea răspunderii la creșterea gradului de confort, nivelului de trai, expansiunii teritoriale, care au ca rezultat afectarea activităților antropice către spațiul subcarpatic, în acest sens diminuându-se semnificativ distanța dintre zonele de risc și obiectele ce au nevoie de protecție, precum cele de infrastructură de transport sau turistică.



Cuvinte cheie: dinamica, GIS, geomorfologie, Subcarpați

Beneficiile tratamentelor balneare din stațiunile balnoclimaterice românești. Studiu de caz: județul Mehedinți

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Rezumat

Potențialul hidromineral românesc este bogat atât din punct de vedere al tipurilor de surse hidrominerale, cât și al compoziției chimice a acestora. Tratamentele balneare sunt recomandate în mai multe afecțiuni, iar beneficiile acestor tratamente se resimt mult timp după încheierea tratamentului. Cele 160 de stațiuni balneare românești, beneficiază de ape carbogazoase, ape oligominerale, ape alcaline, ape feruginoase, ape clorosodice, ape sulfuroase, lacuri terapeutice, mofete, nămoluri, saline, etc.

Județul Mehedinți se bucură de un potențial turistic diversificat reprezentat în principal de fluviul Dunărea şi de defileul său, dar și de existența unui relief, bogat în elemente floristice şi faunistice deosebite. Pe lângă turismul religios, turismul sportiv, turismul speologic, turismul cultural-istoric, ecoturismului, turismul balnear iese în evidență datorită factorilor benefici ai apelor hidrominerale existente, fapt ce determină o analiză amănunțită a acestora.

Studiul urmărește determinarea potențialului hidromineral (tipuri de surse hidrominerale, beneficiile acestora, gama de afecțiuni ce se pot trata precum și bazele de tratament existente), repartiția principalelor surse hidrominerale regăsite în arealul de studiu, infrastructura de cazare, dar și tehnicile de promovare și suportul normativ existent la nivelul județului. Scopul îl reprezintă creșterea atractivității județului ca și destinație turistică.

La nivelul arealului există bazine hidrogeologice cu importante rezerve exploatabile de apă potabilă subterană (bazin Strehaia, Poiana Gruii, Jiana Mare-Vânju Mare), bazine cu apă minerală şi termală (bazin Schela Cladovei-Gura Văii, Bala-Crainici), precum și bazine cu ape minerale necercetate (identificate în localitățile Colibași, Lupșa, Baia de Aramă, Balta, Vârciorova).

Infrastructura balneară și de tratament local, împreună cu structurile de cazare joacă un rol important în dezvoltarea acestei forme de turism în arealul studiat, determinând creşteri atât din punct de vedere al investiţiilor, cât şi al numărului de turişti.

Cuvinte cheie: turism, potențial hidromineral, tratamente balneare, județul Mehedinți

Siret valley between Roman and Mărășești settlements – preliminary geomorphological approach

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Abstract

The Siret Valley is generally asymmetrical in the study area, with the left side being short and steep and the right side being long and gently sloping, on which the entire series of river terraces can be seen. In the current study, we attempted to determine which terrace of the Siret River is the highest in this area. This information could lead us to discern the paleogeomorphological evolution of the Pietricica Hill, the Zăbrăuți Platform, and the Tutova Hills, as well as the Siret Valley and the lower Trotușului Valley. Given that, the Pâncești Platform and the Zăbrăuți Platform are composed of Cândești gravels, which are not present in the Culmea Pietricica, being composed of Miocene conglomerates and abundant greeschist, wich suggests that the massive subcarpathian peak rose only recently (during the Quaternary; Brânduş first proposed this theory in 1979). According to the alluvial remains discovered, the highest terrace in Siret is located between 125 and 130 meters above sea level (east of Buchila village), and based on the morphology of the terrace bridges, at 170 – 190 m (Șoșușca, Dalul Rusului, Dealul Teiuș – Răcăciuni, the interfluve between the Orbeni and Drăgușani streams, etc.).

By identifying the type of soil on each morphological landform and using radiometric and paleontological dating to determine the age of the alluvial and deluvial material, we are attempting to accurately date the age of the terraces of the Siret, Lower Bistrita, and Lower Trotușul rivers. For this preliminary communication, we used cartographic materials from Ms. Lecturer's doctoral thesis. Dr. Florina Tatu and the field observations carried out by the authors of the study on Valea Siretului and Valea Bistriței in January and March 2022, February and March 2023.

Cuvinte cheie: Siret Valley, geomorphology, morphological landform.

The development of the Tram-Train concept using the geomorphological favorability analysis. Case study: Galați-Brăila (RO) metropolitan area

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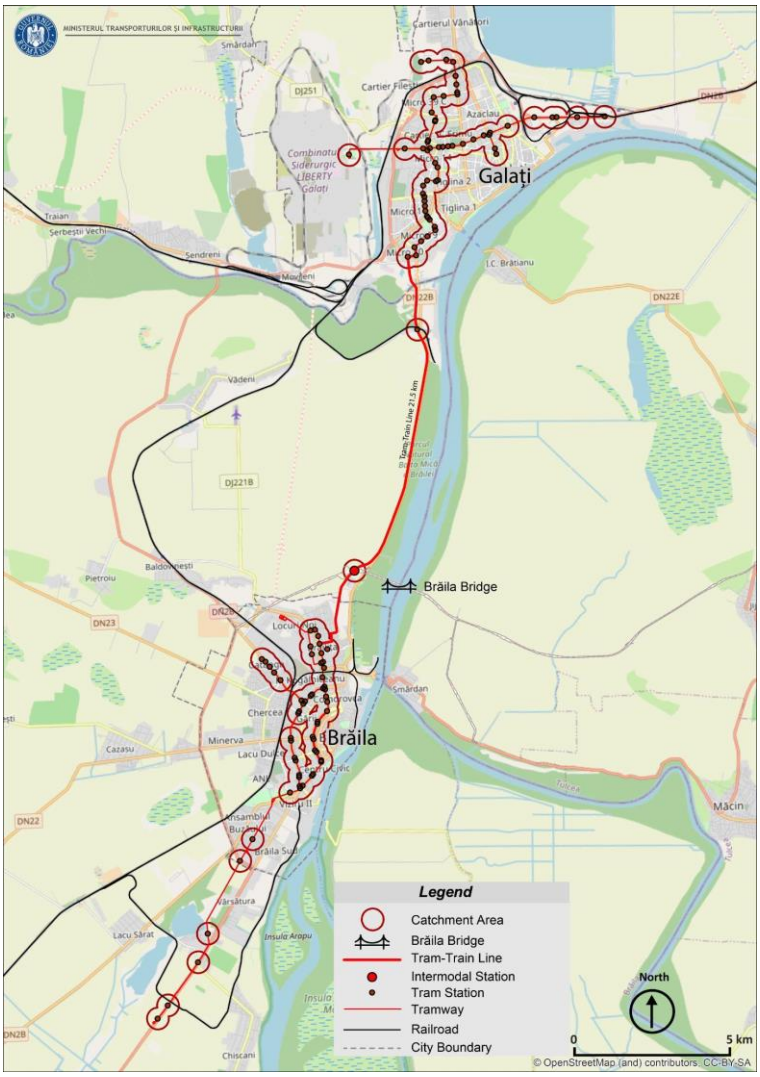
Abstract

The project's objective is to develop a study on the development of the Tram Train concept in Galați-Brăila metropolitan area. It represents a preliminary stage for the implementation of the pilot project, with major benefits for population mobility, for increasing economic activities between the two cities, and for reducing carbon emissions by encouraging an environmentally friendly, multimodal mode of transport.

The Action will create a complex database (GIS, statistical and multimedia data) that has an impact on improving transport conditions and on the decision for making modal shifts. The GIS database will be used for implementing the methodology developed in the project. The results will be recommendations in the related specifications for the implementation of the project. They will also be transposed into the digital environment, in the form of an interactive multi-layer spatial map and will be accessible through the website dedicated to the Action.

The Tram-Train system that might be implemented in the Galați-Brăila metropolitan area proposes a modern connection solution, innovative in terms of connecting two municipalities of similar size, both having tram networks with similar gauge.

Therefore, by conducting a complex analysis regarding the connection of the existing tram networks, new multimodal connectivity with the national railway network, with the national road network (connectivity with the Brăila Suspension Bridge), with the river and sea ports Galați and Brăila could be developed, all financed by European funds. Moreover, possibilities for cross-border extensions between Galați and Giurgiulesti, through the connections with the Republic of Moldova and Ukraine, could be developed.



The project is expected to have a positive impact in promoting the sustainability of multimodal transport through the cooperation of local and central administrative entities, and to become a model of good practice at national level.

Cuvinte cheie: tram-train, rail, multimodal transport

Determinarea dinamicii versanților în arealul orașului Comarnic prin analiza morfometrică și morfografică a reliefului utilizând tehnici GIS

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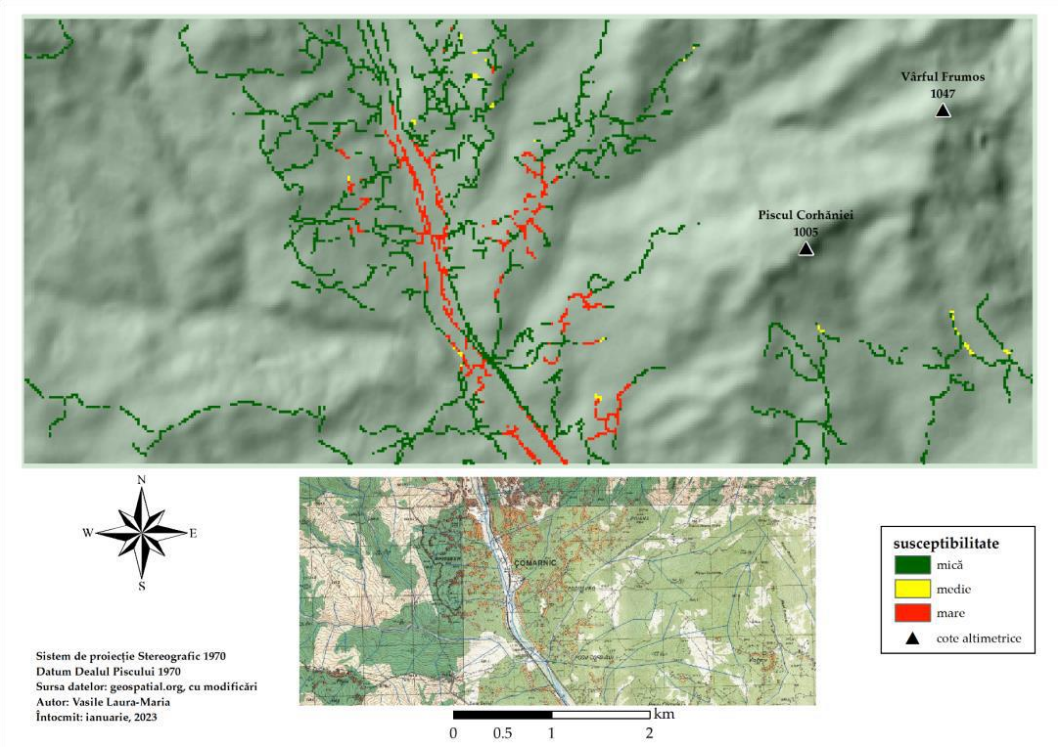
Rezumat

Sistemele Informaționale Geografice reprezintă un domeniu cu o expansiune grabnică, iar în industria geomorfologică este folosit în diverse scopuri, pentru a furniza: o bază digitală de hărți pentru cele tipărite; evoluții ale proceselor geografice, pretabilități, susceptibilități, etc. Această tehnologie oferă cele mai mari oportunități în dezvoltarea analizelor geografice și a determinării dinamicii versanților prin intermediul hărților create.

Crearea și dezvoltarea acestei cercetări a pornit prin acumularea și ierarhizarea unui volum bogat de date geografice prin intermediul cărora s-au desprins elementele necesare fundamentale cercetării. Pentru a realiza partea cartografică a analizei s-a cumulat, prelucrat și structurat volumul mare de date, urmat de procesul vectorizării utilizând sursele raster.

Lucrarea și-a propus cunoaşterea principalelor caracteristici fizico-geografice ale arealului, a tipurilor şi formelor principale de relief şi evidenţierea particularităţilor morfometrice, morfografice şi morfologice, în modul de utilizare a terenului din spaţiul montan.



Cuvinte cheie: analiza morfometrică, GIS, caracteristici fizico-geografice.

Controlul riscurilor de mediu prin intermediul sistemelor de management de mediu

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Rezumat

În prezent, rapiditatea schimbărilor economice la nivel mondial determină provocări dificil de ținut sub control pentru că cererea este din ce în ce mai presantă datorită demografiei, considerând și politicile sociale adoptate mult mai protective. În acest mod, presiunea asupra resurselor naturale este tot mai mare, iar regenerarea lor devine dificilă. Pe de altă parte, societatea are întotdeauna legile ei de reglare, dar acest lucru depinde de calitatea acestor legi, bazate pe experiențe, obiceiuri regionale, capacitatea de a se adapta tuturor factorilor de risc. În acest context, pentru a nu se crea haos, este nevoie de mijloace de control. În acest sens, s-au creat structuri tocmai ca să țină sub control aspectele de mediu.

Unul din mijloacele de control este reprezentat de sistemele de management de mediu care au ca scop fundamental controlul aspectelor de mediu (interactiunea activităților umane cu elementele cadrului natural, din care derivă impacturile de mediu pozitive sau negative, semnificative sau nesemnificative).

Obiectivul central al sistemelor de mediu este managementul riscurilor datorită aspectelor de mediu controlate de om. Procesele de management al riscurilor sunt reprezentate de: identificarea aspectelor de mediu și evaluarea lor pentru a determina care din acestea sunt semnificative și care sunt nesemnificative (există multe metode de evaluare a aspectelor de mediu dezvoltate de experți sau de firme care au decis să aplice în maniera lor standarde ale sistemelor de management de mediu).

Riscurile de mediu sunt efectele posibile ale activităților asupra mediului, iar rolul cel mai important în menținerea sub control al aspectelor de mediu îl au părțile interesate. Managementul riscurilor asupra mediului este întotdeauna legat de decizii în termeni de leadership pentru a reduce impactul activităților umane asupra mediului (începând cu nivelul guvernamental și până la nivelul întreprinderilor și chiar al cetățeanului de rând, fiecare având un rol în sistem).

Cuvinte cheie: riscuri, management, system.

Danube Defile

Danube, the second river from Europe (2857km.) after Volga, in length as well as in debit, has as source Padurea Neagra Mountains (Germany) and disgorges in Black Sea trough its three channels: Chilia, Sulina si Sf Gheorghe. In its way, passes several mountains, eight countries (Germany, Austria, Czech Republic, Hungary, Serbia, Bulgaria, Ukraine) and three capital cities (Vienna, Budapest and Belgrade). In our country enters from western Buzias and until the disgorging in the Black Sea has a length of 1075km, which means more than a third from the total length.

The defile develops on a length of around 144 km from Bazias until Gura Vaii. Between these limits are a series of sectors of narrow valley as the ones from Pescani, Cazanele Mari, Cazanele Mici, Porile de fier, as well as the sectors of large valley (depressions) at Moldova Veche, Dubova, Svanita, Orsova (fig. 3).

This territory bordered by mountains is a real open-air show, representing a true harmony between the mountains and the river. The area is declared unique monument of nature in Europe, the climate here being mild and the vegetation is Mediterranean.

By Danube's Boilers it is understood the defile's part between the river mouths of the rivers Plavisevita and Ogradena. They consist of two different parts: the large boilers and the small boilers, separated by a semicircular gulf, the Dubova bassinet. This area has been declared natural reservation in 1980 but the importance of this space was acknowledged a long time ago.

The region is inhabited by Romanians and Serbs, some settlements having a Serbian majority. It is the case of Socol, Pojejena and Sviniţa. There is also a significant Czech community around Garnic, and especially in Bigăr and Eibental villages. On the other hand, in the city of Orşova, German ethnics are rather numerous.

The Danube Defile differs markedly from the rest of the Danube's course, because on this stretch the valley is squeezed between mountains that tower over the river, rising up several hundred meters. In addition, the highly dissected slopes fall in steps towards the river's channel and the base level is very low: 70 m at Baziaş and 43 m at Gura Văii.

Between the previously mentioned settlements, the Danube has carved one of the most spectacular defile in Europe, which is 130 km long; within it, the river's channel is incised into a tectonic and erosion corridor, more than 200 m deep and between 3 and 10 km wide. The left bank, lying on the Romanian territory, is represented by the Locvei Mts. (794 m in the Tâlva Cornului peak), followed by the Almăj Mts., as high as 1226 m (Svinecea Mare peak), the Mehedinţi Tableland, with mean altitudes of 500 m, and the Mehedinţi Mts. (maximum elevation 1466 m in the Varful lui Stan peak). The right bank, which is on the Serbian side, is represented by the Debrianske Planina Mts., averaging 800 m altitude, and farther downstream by the Miroci Planina Mts., with mean elevations of 500-550 m and culminating in the Veliki Strbac peak (768 m). Due to geology and tectonics, the watercourse along the defile is made up of a sequence of stretches that differ in morphology and structure, some being narrow and some others wider and looking like small depressions.

***Cazanele*,** represent the most spectacular part of the Danube Defile. They are composed of two distinct stretches, namely the *Cazanele Mari* (*the Big Boilers*), between Plavişeviţa and the Dubova depression, 3.8 km long, and the *Cazanele Mici* (*the Small Boilers*), with a length of 3.6 km. The

Cazanele are carved into the level of Romanian deposits lying at an elevation of 300-320 m, which in the area of the Ciucarul Mare peak shows well-developed surface and underground karst topography. As far as the Ciucarul Mic peak is concerned, this is dissected on a northwest-southeast direction by the Mraconia valley, which following the creation of the Iron Gates dam has been turned into a small inlet, 1,5 km long and 250 m wide. The area presently attracts many tourists, especially after the figure of Decebal (a famous ruler of Dacia) has been carved into a calcareous cliff watching the entrance into the Mraconia gorges. The Dubova depression, about 600 m in diameter and lying at 55-60 m altitude, has become in its turn a semicircular inlet with a diameter of 1.5 km.

In the aftermath of the creation of the Iron Gates hydropower station, water level rose and consequently, the whirls and rough waters that menaced the Danube Defile, and especially the *Cazanele* area, became a thing of the past. In fact, the name *Cazanele* (*the Boilers*) was inspired by the dark foamy waters that roared through the corridors and fjord-like inlets.

Upstream of Orşova, near the Eşelniţa village, is the entrance into the *Cazanele Mici* (*the Small Boilers*) (fig. 3), a stretch flanked by the Ciucarul Mic summit (313 m), on the left, and Mali Strbac (626 m), on the right, both representing Mesozoic calcareous massifs. On this reach, which is about 3.6 km long, the width of the channel is the lowest (150 m). The vertical walls of the Ciucarul Mic exhibit a castellated relief, but bushes of wild lilac (*Syringa vulgaris*), hornbeam (*Carpinus orientalis*) and wig trees (*Cotinus coggygria*) can be seen on their calcareous benches. Farther downstream, the calcareous walls are split by the Mraconia brook. The road accompanying the bank has been cut here and there in the hard rocks. From its height, one can see a rock spur emerging from the water, where sailors used to stop and say their prayers before engaging in the dangerous crossing of the fierce *Cazanele* stretch. On the other hand, looking up from the bottom of the valley one is impressed by the vertical cliffs, falling in steps to the water surface.

The Golubac Fortress (foto 2) was built seven hundred years ago on a strategic position, at the upstream entrance into the Danube's Cazane and the Iron Gates. Presently, they belong to the Djerdap National Park, stretching out on the Serbian territory. The fortress was meant to safeguard the terrestrial and river traffic and at the same time, it served as a tollgate. In order to fulfill its mission, it was equipped with a huge iron chain, which could be lifted whenever necessary in order to stop the boats that might have tried to pass without paying. A similar method was employed by the Byzantines in their endeavor to protect Constantinople from being taken by the Turks.

The fortress was erected on the site of a Roman settlement lying not very far away from the Tabula Traiana, a Roman memorial stone plaque dating from the time of Emperor Trajan, and the Bridge of Apolodor. The Romans called the place Columbria and the Serbian name also suggests a place where pigeons used to live. The fortress, surrounded by strong stonewalls, ten towers and a mote was heavily disputed and used in turns by Serbs, Hungarians and Turks, either as a last refuge or as an outpost of the Ottoman Empire. The stronghold, which seems to grow by itself from the mountain rock, was once inhabited. This explains the name Stari Grad (the old city) by which it is designated by the locals, so that to distinguish it from the present Golubac city and resort, lying 4 km downstream, on the Danube bank.

Foto 1 – The Small Boilers (foto, Carablaisa S.)

Foto 2 – The Golubac Fortress (source, Internet)

The most popular landmark from the Boilers is represented by the stone sculpted face of the ***Dacian king Decebal***, situated in the Small Boilers, on the Mracunei Valley at the confluence with the Danube, between the villages Eselnita and Dubova, at about 18 km of Orsova. This stone sculpture is the biggest of Europe, with a height of 55 m and a width of 25 m. It was done after the model of the Rushmore Mountain cliff and has 6 m less than the Statue of Liberty and about 10 m more than the height of the legendary Colossus of Rhodes. Its construction lasted 10 years (1994-2004), the idea belonging to the business man Constantin Dragan, who invested over 1 million dollars in it. Besides, under Decebal's face you can find a latin inscription: "Decebal Rex – Dragan Fecit" ("king Decebal – made by Dragan).

In the same area you can find also the ***Tabula Traiana*** (foto 3, left), a monument of almost 2000 years old, when leaving the Small Boilers, on the Serbian bank, not far from Decebal's statue. The monument was built by the enemy of king Decebal, the Roman emperor Traian in order to mark the triumphal march of the Roman imperial troupes towards Dacia and to commemorate the Roman Empire's victories over the dacian kingdom in the year 105.The most popular landmark from the Boilers is represented by the stone sculpted face of the Dacian king Decebal, situated in the Small Boilers, on the Mracunei Valley at the confluence with the Danube, between the villages Eselnita and Dubova, at about 18 km of Orsova.

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Foto 3 - Tabula Traiana (left) and Dacian king Decebal stone (right) (foto, Carablaisa S., 2011)

Mraconia Monastery (foto 4). On Mraconia Valley, there was an old monastery called "Mracu-na", flooded by the reservoir lock water. The old halidom was positioned in front of the old Roman road from the Serbian shore, where "Tabula Traiana" still exists. Today, a church was built on the Danube River shore in order to remind to the people about the old halidom and fishermen-monks.

From the Dubova inlet and as far as the confluence with the Plavişeviţa brook, the Danube enters the second narrows, *the Cazanele Mari* (*the Big Boilers*), flanked by the calcareous cliffs of the Ciucarul Mare peak (318 m) and its Serbian neighbor, Veliki Strbac (786 m). The walls of the *Cazanele Mari* are more than 200 m high, whereas the channel width is 150 m. Here and there, the cliffs are pierced by caves, of which the most important are Gura Ponicovei and Veterani. The karst topography is well represented by surface forms (dolines, grykes, the short and wild gorges of the Ponicova brook) and endokarst forms (a few avens and several caves). The entire area is part of the Iron Gates Natural Park, created in order to protect the Submediterranean species and the exceptional landscape, which is unique in Europe.

Foto 4 - Mraconia Monastery (foto Carablaisa S., 2011)

The Cazanele Mari (foto 5) area is endowed with a diversified flora, with Central and East-European elements, but also Submediterranean, endemic and relict species, drought tolerant and heat resistant, some of which have survived the Ice Age. Here, one can see bushes of wild lilac (*Syringa vulgaris*), hornbeam (*Carpinus orientalis*), maple (*Acer monspessulanum*), flowering ash (*Fraxinus*

ornus) and wig tree (*Cotinus coggygria*), as well as irides (*Iris germanica*), bluebells (*Hyacinthoide non-scripta*), tulips (*Tulipa*) and ferns (*Pteridophyta*), which have found shelter among the inhospitable rocks of the defile.

Ponicova Cave (foto 6, fig 4) the largest in the entire Danube Defile (the galleries total 1660 m) can be accessed from land or by boat on the Danube. It is located in Cazanele Mari of the Danube. It's accessible even to less experienced people, the equipment can be one of circumstances. We recommend the active gallery (of the river Ponicova) and the archaic one (Hall of Columns of the Great Snake).

Foto 5 – Ponicova cave (foto, Carablasia S., 2011)

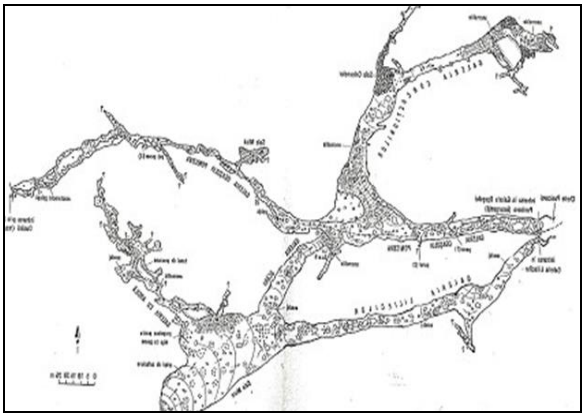

Figure 6 – Ponicova cave map

Gura Ponicovei Cave presents several levels of galleries, the lower ones being active. From the galleries of fossils, the most spectacular is Concretionara Gallery and the Room of columns. Here, water and time have created the stalactite and stalagmite of different shapes and sizes, domes and columns, floor of white calcite, cave pearls, curtains etc. Also in this cave were found bones of bear and cave hyena. Enthusiasts can visit the Bat gallery with guano. An informed companion is recommended for those that come first. Structure of rock: limestone. Maximum wall height: approx. 80 m.

Foto 7 - The Veterani cave (by Carablaisa S., 2011)

Foto 8 - The Tricule fortress (by Carablaisa S., 2011)

The Veterani cave (foto 7), 87 m long, is known since ancient times. It was worshipped by the Dacians as the sanctuary of the supreme god Zamolxis. The name derives from an aide named Veterani, who served under Ianovici, the commander of the Austrian army, who strengthened the cave at the end of the 17th century. Due to its strategic position on the Danube Boilers, but also to the generous size of the Great Hall, the cave was used as a military garrison, being disputed by the political powers of those times. At the entrance, as well as inside the cave, fortifications, walls and dwellings were built, and later on maps were drawn, thus making of it the first charted cave in the world. Most of these constructions, the water tank and numerous inscriptions can be seen even today. The access is possible from the Danube. The tourists may step on a small mooring pontoon lying at the base of the access wall, from where must climb a short declivity to reach the cave's entrance.

The Tricule fortress (foto 8), or the medieval stronghold Tricule (also Tri Kule or Triculi), which is lying about 4 km downstream of Sviniţa, on the left bank of the Danube, dates from the 15th century. It was erected with the clear purpose to stop the Ottoman expansion north of the river. Initially, it boasted with three towers, but one of them was subsequently destroyed by the floating ice chunks and what was left of it was covered by the waters. At present, the towers are flooded and the southern one, lying on the right bank of the river, is totally submerged. However, when water level drops during the hot summer days it becomes hardly visible.

The Drencova fortress or ***the Dranko's Tower*** (***Castrum Dranko***) (foto 9) is found 2 km downstream of Berzasca, right in the middle of the Danube. Its ruins evoke wonder and curiosity to the travelers, who rightly ask themselves what secrets they hide. The stronghold is a historical monument. It dates also from the 15th century, when it was built on top of a former fortress in order to protect and control the boat traffic. The information about this place is rather scarce, but it is highly probable that a Roman construction existed here before, between the 1st and the 3rd centuries A.D., as part of the Roman fortification system along the Danube. It had its first documentary mention in a court order issued at Timişoara in 1451, by which Iancu of Huedoara reconfirmed the mastery over this territory to Mihai de Horna, the Ban of Severin, to his son Nicolae and to a knight named Nicolae of Byzere. In fact, this was a renewal of the acts issued by King Albert I of Hungary (1438-1439), who had donated the Dranko camp to the three people, in exchange for their contribution to the fight against the Ottomans. Later on, the fortress was destroyed by the Turks and in the modern days, after the creation of the Iron Gates I dam, its ruins were covered by waters.

Foto 9 - The Drencova fortress or the Dranko's Tower (Castrum Dranko) (by Carablaisa S., 2011)

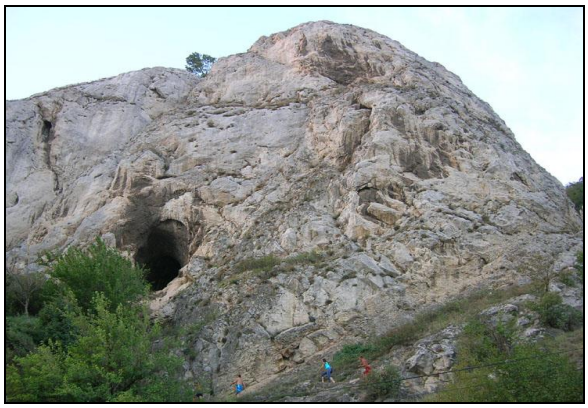

Foto 10 - The Gaura cu Musca cave (surce, Internet)

The Gaura cu Musca cave (foto 10) also known as *the Columbaca cave*, was formed in the left side of the Danube Defile, 3 km downstream of Coronini and 28 m above the water level. It has a dry tunnel, as well as an active one, the latter showing two lakes, 1 and 2 m respectively deep. These are drained by a small stream, the waters of which are collected at the resurgence point located on the side of the road going to Moldova Nouă. The flies that seem to get out of the cave are a species of *Chironomidae*. As a matter of fact, they do not really get out of the cave, but come here to lay their eggs in the waters that emerge from it and flow away to the Danube. It is worth mentioning that these *Chironomidae* eat eggs, larvas and *Simulidae* nimphs. Legend goes that the flies come from the head and blood of the dragon killed a long time ago by Iovan Iorgovan, a local folk hero. In his turn, Abbot Grisselini mentioned a Vlachs' legend according to which the flies come also from a dead dragon, but supposedly killed by Saint George. The legend was firstly published at Vienna, in 1867, by A. M. Marinescu, who made reference to the popular ballad „*Iovan Iorgovan and the Snake*", which says that an emperor's son, seeing the effect of the thermal waters on the dragon, took himself a bath and became stronger. The ballad was also resumed by V. Alecsandri in his poetry volume „*Poezii populare ale românilor*" (Şelău N).

St. Ana Monastery is situated on the Danube Defile, one of the most beautiful natural places in our country (foto 11). Danube Defile is rich in signs of christendom. The monachal place is a monastery of nuns having a parish life, in Orsova, Mehedinti County, which has the patron St. Ana, celebrated on July 25.

St. Ana Monastery is located on Mosului Hill, a place that offers an unique landscape. The monastery was founded by the journalist Pamfil Seicaru, fighting here as a lieutenant in the First World War; he wanted to express his gratitude to God because he survived after it had been buried here by a bomb explosion. For the facts of his courage, Pamfil Seicaru was granted the title Knight of the Order of "Mihai Viteazul."

Foto 11 – Saint Ana Monastery (by Şelau N.)

St. Ana Monastery was built in traditional wooden churches style, between 1936-1939, the church was in the center of the monastery, complex of cells for the nuns was on the sides. The interior paintings were erased during the communist period, keeping only the paintings of the tower.

During the communist regime, St. Ana Monastery was a sanatorium for patients suffering from tuberculosis and camp for children, the church being transformed for a while in a bar then in a motel reception. Nearby was built a restaurant, building which passed in management of the monastery in

1993. The dedication of the monastery took place on 2 December 1990, and was carried by the bishop Damaschin Severineanu. Between 1993-1997 were carried out extensive restoration works, the iconostasis and wall paintings being restored, which have been sanctified by the holiness Nestor Vornicescu in 1999.

The monastic complex was originally constructed from a wooden church, with elements of traditional Romanian style, and cells on both sides, the essemble forming the letter U. In the last decade the steeple with a summer altar and a former public nutrition block in which currently works Pamfil Seicaru Memorial Museum, the library, the refectory and a sewing workshop were built.

Băile Herculane (foto 12). The city and spa of Băile Herculane is situated in the southwestern part of Romania (the Caraş-Severin County), on the Cerna Valley, between the Mehedinţi Mts., to the east, and the Cernei Mts., to the west. The settlement lies at 168 m altitude above sea-level and spreads along both sides of the Cerna River, on the bottom of a narrow depression, bordered to the west by the Mehadiei Ridge (with the summits Coronini, Doda and Ciorici) and to the east by the Domogled and Susculi cliffs, which tower over the city by as much as 1000 m.

The calcareous mountains shelter the depression and keep it warm during the cold season and consequently the climate is very much alike the Mediterranean one. On both sides of the Cerna River are dwarf tree forests composed especially of lilac (*Syringa vulgaris*), while the black pine of Banat (*Pinus nigra var. banatica*), with large umbrella-like canopy, which can be seen on the steep crags, lends the gorges an aspect of Mediterranean valley.

According to archeological discoveries, the area of Băile Herculane seems to have been populated since the Primitive Commune. It is one of the oldest spas in Romania, first known and turned to account by the Dacians and subsequently by the Romans.

Foto 12- Baile Herculane (left) Tasna Gorges (right) (by Carablaisa S.)

After conquering Dacia, the Romans paid particular attention to the hot springs, building here a large spa, famous throughout the empire, where important officials used to come for healing and recreation. It is believed that the Roman baths were chaining along the river's banks, taking advantage of the manifold sulphurous hot springs, which popped from the mountain rocks on a distance of about 7 km. The presence of the Romans on this territory is testified by the ancient coins discovered here, but especially by the votive inscriptions left as a sign of gratitude by some of those who were healed by the hot springs. From what is known, at that time the spa was called *Thermae Herculi ad Mediam*. In the aftermath of the Romans retreat from Dacia, the hot springs at Herculane

continued to be used by the local people for centuries. All the while, the periods of reconstruction and development alternated with destruction intervals, brought about by the wars.

From the point of view of anthropogenic attraction the spa is clearly divided into two distinct parts: the old, Austrian part, with beautiful and stylish buildings, true architecture monuments, and the new area, made up of the big communist hotels, which contrasts sharply with the previous one.

Cheile Țăsnei (Ţăsnei gorges)

The Ţăsna gorges (foto 12, right) are carved in the right slope of the Cerna Valley, 12 km upstream of Băile Herculane spa. In order to visit them, from the upper end of the „Şapte Izvoare" reservoir the traveler needs to go about one kilometer upstream until he finds a sign pole indicating the entrance in the Ţăsna gorges. The itinerary is marked with a blue cross, and the time one needs to reach the gorges is two hours.

The Ţăsna gorges are among the most beutiful valley stretches carved in limestones in Romania, especially due to the wilderness of the scenery and the spectacular cliff formations: impressive cliffs, crags, needle-sharp peaks, troughs, screes and rock streams (foto 12, right). The gorges are made of narrow stretches in alternation with larger ones and here and there rapids can be seen. Long ago, the Ţăsna brook formed a part of the border between Wallachia and the Austro-Hungarian Empire, which followed the ridge of the Mehedinţi Mts., climbing then as high as the mouth of the Craiova brook. On its way, the river dissapears at times in the ground, flowing beneath the limestone deposits, but when the valley begins to widen its waters come to light. The trail accompanying the valley is flanked on the right by a steep wall and on the left by a calcareous amphiteather covered by patches of bushes towered over by the black pine of Banat. Gradually, the gradient becomes gentler and the trail approaches the upper end of the gorges. Unexpectedly, a water mill comes in sight, the Devil's Mill, the presence of which in this area amazes and puzzles the traveler. Making a detour to the right the trekker will leave the mill behind and not very far away the gorges will end up in a beautiful glade. Here, a cold water source, the Stiubeiului Spring, may quench the traveler's thirst, and also here one can see a sheepfold, where the shepherds use to wait for the tourists to come in order to sell their traditional products. The maximum elevation of the Ţăsna Glade is 500 m.

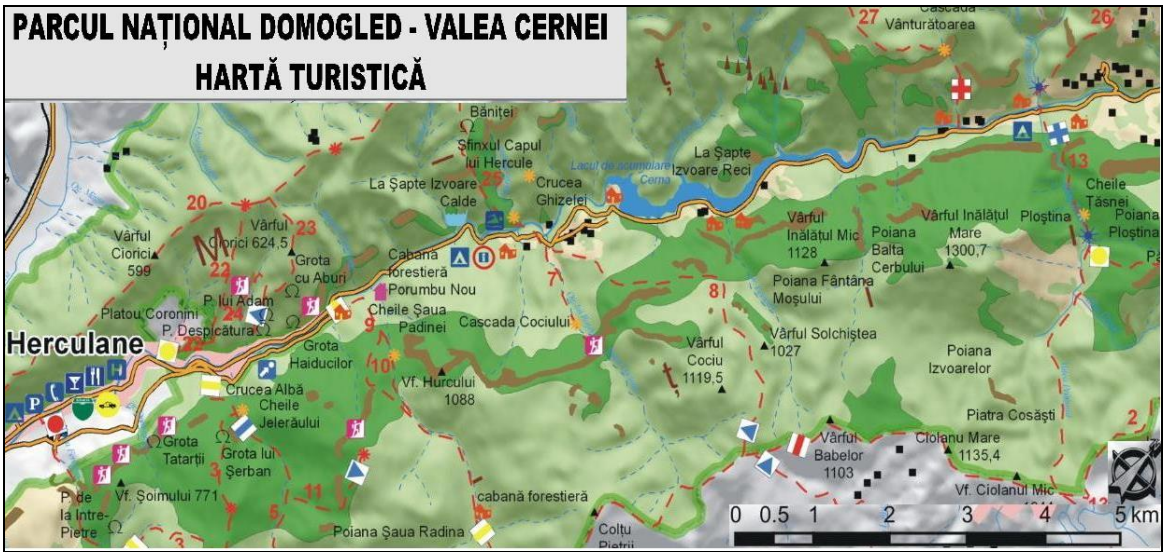

Figure 13 – Cerna Valley. Touristic map

Lacul Porţile fe Fier

Caracterizare fizico – geografică și funcţională - *Nicolae Șelău*

Prin edificarea Sistemului hidroenergetic și de navigație Porțile de Fier a luat naștere lacul omonim, care ocupa cursul Dunării între km fluviali 943 – Gura Văii-Șip și km 1214, respectiv gura de vărsare a râului Tisa. Trebuie menționat că amonte de Baziaș caracterul lacustru se manifestă din ce în ce mai estompat, doar prin remuu, astfel că lungimea sa variază în funcție de nivelul de retenție la baraj. Acest nivel are o amplitudine cuprinsă între 63 m – nivelul minim de funcționare a turbinelor și 69,5 m – nivelul maxim de retenție, în altitudini absolute față de Marea Adriatică.

Datorită cuprinderii văii între munți, care domină fluviul cu sute de metri, a reliefului în trepte, puternic fragmentat, a nivelului de bază foarte coborât: 70 m, altitudinea absolută a luncii la Baziaș si 43 m la Gura Văii, defileul dunarean se deosebește net de restul cursului Dunării. Între localitățile menționate, Dunărea a fierăstruit pe 130 km unul dintre cele mai spectaculoase defilee din Europa; în cadrul său fluviul este încorsetat într-un culoar tectonic și de eroziune adâncit cu peste 200 m și larg între 3 și 10 km. Malul stang, românesc il constituie munții Locvei apoi munții Almaj, cu altitudine maximă în varful Svinecea Mare (1226 m), munții și podișul Mehedinți, cu altitudini medii între 500 m în munții Locvei (max.794 m în Talva Cornului) și 950 m în munții Mehedinți (max. 1466 m în Vârful lui Stan). Malul drept il formează munții Debrianske Planina cu înălțimi medii de 800 m și în continuare, Miroci Planina cu înălțimi medii de 500 – 550 m și max 768 m în vârful Veliki Strbac. Urmare a geologiei și tectonicii, cursul fluviului în defileu este alcătuit din sectoare morfologic și structural diferențiate, porțiunile de îngustări alternand cu lărgirile din bazinete.

Construirea barajului de la Gura Vaii s-a realizat în parteneriat cu Iugoslavia în perioada 1964-1972, producând mutatii semnificative la nivelul ecosistemelor naturale si umane. În prezent lacul de acumulare Portile de Fier este utilizat pentru producerea de energie electrica, regularizarea debitelor Dunarii, piscicultura, navigatie si agrement, fiind un habitat preferat pentru multe specii de pasari.

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