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AL CENTRULUI UNIVERSITAR NORD DIN BAIA MARE

SERIA D

Exploatări Miniere

Prepararea Substanţelor Minerale Utile

Metalurgie Neferoasă

Geologie şi Ingineria Mediului

Volumul XL Nr. 1

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SUSTAINABLE ENERGY VALORIZATION OF MOUNTAIN WETLANDS: AN ENGINEERING SCREENING FRAMEWORK FOR NORTHWESTERN ROMANIA

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Abstract: *Mountain wetlands in Northwestern Romania within the Maramureș Mountains Natural Park provide critical hydrological regulation, carbon storage, and biodiversity support, yet remain largely untapped in water–energy nexus planning. This paper evaluates sustainable, low-impact energy valorization of these systems using an engineering-oriented framework structured around a five-stage workflow: (1) GIS-based prescreening applying exclusion rules (slope, existing hydraulic structures, protected habitats, access); (2) targeted field verification; (3) decision dossier preparation; (4) governance and stakeholder review with peatland water-table stability as a non-negotiable hard constraint; and (5) minimal monitoring design. The methodology integrates comparative hydrological scenario analysis (baseline vs. retrofit vs. disturbance), qualitative to semi-quantitative ecosystem service trade-off assessment (water regulation, climate regulation, biodiversity, cultural services), and two complementary energy pathways: direct micro-hydropower retrofits on existing drops and outlets, and indirect benefits from peatland conservation and rewetting. Results demonstrate that technical feasibility alone is insufficient; a conservation-aligned engineering stance that prioritizes "existing infrastructure first," treats peatland drawdown as an exclusion rule, and embeds monitoring commitments reduces exposure to regulatory rework, operational underperformance, and stakeholder conflict. For Northwestern Romania, the most defensible pathway is a limited number of high-quality retrofits coupled with peatland restoration, aligning with EU Nature Restoration Law and climate mitigation priorities. The framework offers a replicable, audit-ready screening logic for data-limited mountain wetland contexts.*

Keywords: *mountain wetlands; water–energy nexus; GIS screening; peatland hydrology; micro-hydropower retrofit; ecosystem services*

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GIS MODELING OF HYDROLOGICAL DYNAMICS ON CLOSED MINING AREAS

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Abstract: *The closure of coal mines generates numerous environmental problems, including the accumulation and circulation of water in the affected perimeters. Problems with water drainage on the surface of disused coal mines generally develop when groundwater and surface water enter the exploited areas and come into contact with primary and secondary minerals under oxide conditions. During contact with these minerals, water can dissolve the components of the ore and minerals that make up the rock. This paper investigates the use of GIS technologies to simulate the hydrological modelling of surface water on a former coal mine, in order to understand the processes of drainage, accumulation and their impact on the environment. By mapping areas with UAV technology, integrating climate and geological data into digital terrain models (DTMs) and using hydrological algorithms, the study evaluates runoff directions, accumulation areas and risks associated with water contamination. The results obtained contribute to a better management of these areas and to the implementation of sustainable solutions for the restoration of ecosystems affected by mining activities.*

The purpose of this work is the scientific study of a simulation of the formation of the hydrographic network exposed to the climatic factors constantly existing in the environment, created on the surface of a land of a former exploitation mine, by collecting data on the topography of the land. A mining operation is a site where mineral resources are extracted from the earth's subsoil.

The hydrological study of an area has an applicability in the management of water resources because by understanding the way water circulates on a certain surface, we can efficiently manage water resources. This includes assessing the amount of water available, identifying water sources and establishing the necessary measures for its conservation and sustainable use, and analysing the water runoff regime through which flood-prone areas can be identified.

Keywords: *coal mine, GIS, UAV, digital modelling, hydrology, environment, etc.*

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THE CONSEQUENCES OF INSUFFICIENT STUDY OF A SITE OBTAINED BY DRAINING A SWAMPY AREA

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Abstract: *Over time, people have sought to improve land affected by water accumulations and transform it into cultivable land, or even suitable for building construction. The behavior of a construction over time is greatly influenced by the nature of the foundation soil. In the case where the land on which the construction is to be located resulted from drainage and desiccation works of a marshy area, it is necessary to carry out geological and geotechnical studies, through which data on the nature of the foundation soil can be obtained. The design for the future construction will be based on the conclusions of these studies, and the proposed constructive solution and its implementation methods will have to take into account the situation on the ground and the way in which any risk factors identified by the studies carried out may have a disruptive influence on the functionality of the building in question. There are cases when, despite the fact that the adopted constructive solutions are consistent with the conclusions of the preliminary studies, due to inappropriate approaches in carrying out these studies, over time, deformations appear in the structure of the buildings, which affect their exploitation.*

This paper presents the situation of a production hall located on a land obtained by draining a marshy area and filling the resulting voids with waste from construction works, having a superficial layer of productive soil on the upper part. Later, part of the land was concessioned for the construction of the construction in question.

After commissioning, the hall floor was affected by the appearance of areas with differentiated settlements, which led to the start of a monitoring program using geodetic methods. The information obtained showed not only that the process of differential settlement was not only manifested in the case of the floor, but also in the case of a number of thirteen columns in the resistance structure, but also highlighted a dependence between the settlement value per observation cycle and climatic conditions (humidity and temperature).

Keywords: desiccation, geodetic methods, monitoring, settlement-humidity dependence.

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STUDIES AND RESEARCH ON DEFECTS THAT OCCUR DURING THE CASTING OF ALUMINUM ALLOY 7000

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Abstract: *This paper aims to address the subject of defects that can occur when casting aluminum bars.*
This subject is specific to the aeronautical industry, when casting aluminum alloy 7000 into bars up to 6 meters long. These aluminum bars are then processed into specific alloys, such as aluminum alloys 7075, 7050 or the new alloy 7055. The 7075 alloy is the best known and most widely used in this series. The 7050 alloy is specifically developed to provide higher corrosion resistance and better fracture toughness in thick sections compared to 7075. The 7055 alloy is a newer generation alloy, optimized to provide even higher compressive and tensile strengths (approximately 10% higher than 7075), widely used in modern high-capacity commercial aircraft (e.g. high-strength wing structures) [1].

Keywords: *Aluminum bars, casting, defects.*

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HYDROGEOLOGICAL ASSESSMENT OF WATER INFILTRATIONS AND THEIR IMPACT ON THE GEOMECHANICAL STABILITY OF ROCK SALT EXCAVATIONS AT THE TÂRGU OCNA SALT MINE, TROTUȘ MINE, ROMANIA

SANDA MĂRIOARA NAȘ[1,2], RALUCA CLAUDIA GÂLGĂU[1,2,*], IOEL SAMUEL VEREȘ[1,2], VIRGIL MIHAI RĂDULESCU[1,2], ADRIAN TRAIAN RĂDULESCU[1,2], GEORGE ACATRINEI[1,2,3]

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Abstract: *The exploitation of the gem salt from the Targu Ocna Salt Mine, Trotuș Mine, Romania, due to the mining voids created, the initial stability of the massif was destroyed, the hydrogeological conditions of the deposit were gradually modified. The sterile intercalations, especially clayey, which acted as a protective shield against water infiltration, being cracked or broken, opened the possibility of water infiltration through the stratification planes, faults, fissures and cracks.*

The water coming from the condensation on the ceiling, walls and hearth of the mining works produced superficial dissolution phenomena. After drying, the solidified salt remained on the surfaces of the ceiling, walls or hearth of the excavated spaces.

The most illustrative area in this regard is the entrance from the car plan to the V horizon of the Trotus Mine, where the hearth and the ceiling of the rooms are covered with recrystallized salt. On 17.10.2024, when a visit was made underground, before the entrance gate and then approx. 100 meters, at the hearth of the room there were numerous puddles, with a depth of 5-10 cm.

The presence of water in the salt massif generated dissolution phenomena, which affected the bearing capacity of the resistance elements, pillars and floors, in two ways, namely the reduction of the values of the mechanical resistances over time and the reduction of the dimensions of the resistance elements, due to the dissolutions.

The limitation of the phenomena of infiltration of water into the groundwater can be achieved, in the first instance, by carrying out, on the surface, some water capture and drainage works, apart from the cones of collapse of the old basins. In this regard, guard channels, gutters, ditches, or regularization works of the riverbeds of the Trifu and Grebleș streams that cross the exploitation perimeter can be built.

In order to monitor the stability of the land surface in the salt mining perimeter, in addition to the topographic landmarks, located on the area adjacent to the perimeter, continuous monitoring of the morphology of the land was introduced, through aerial photogrammetry from drones. This method allows the construction of continuous, high-precision three-dimensional digital models of the land surface of the entire mining perimeter.

Keywords: *salt, underground, instability, infiltrations, monitoring program*

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ASSESSMENT OF THE HYDROLOGICAL IMPACT ON SLOPE STABILITY: A MULTI-SENSORY ANALYSIS BY GEODESIC, TOPOGRAPHIC, PHOTOGRAMMETRIC, LIDAR METHODS OF A LANDSLIDE

RALUCA CLAUDIA GÂLGĂU[1,2,*], SANDA MĂRIOARA NAȘ[1,2], IOEL SAMUEL VEREȘ[1,2], VIRGIL MIHAI RĂDULESCU[1,2], ADRIAN TRAIAN RĂDULESCU[1,2], MIHAI DORIN ISAC[1,2]

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Abstract: *Landslides are complex geodynamic processes triggered by the breakdown of the balance between active gravitational forces and the shear strength of the earth massif. This instability is often the result of the interaction between intrinsic geological factors and external triggers (precipitation, thermal variations, anthropogenic activities).*

The causal factors of landslides vary in their action over time and it should be emphasized that the influence of different factors (agents) on the equilibrium state of the slopes is exerted in a combined and not isolated way. Most of the natural mechanical factors that lead to landslides are directly dependent on the presence of surface water and groundwater. The surface waters exert a permanent erosion action of the banks and the base of the slopes. The phenomenon leads to a decrease in the resistance forces, which determines the reduction of the slope's stability until the equilibrium phase, the limit at which the landslide occurs. The action of groundwater on the land is manifested by the water pressure in the pores, the filtration pressure and the suffocation process, to which are added the change in time of the physical-mechanical properties, the reduction of the mineralization of the water in the pores and the negative effect of the rise of the groundwater level.

The study demonstrates that the multi-sensor and multi-temporal approach through topographic, photogrammetric and LiDAR methods is a robust solution for monitoring landslides, offering a high level of accuracy, detail and repeatability. In the case of the landslide in the premises of CMID Dobrin, Sălaj County, the analysis highlighted an active instability of moderate intensity, controllable by appropriate technical measures and by maintaining a systematic geospatial monitoring program.

The methodological approach, which combined high-precision point measurements (total station, static GNSS systems) with extended coverage measurements (UAV photogrammetry and LiDAR), proved to be highly effective. Digital elevation (DEM), surface (DSM) and terrain (DTM) models derived from LiDAR data allowed for the identification and detailed mapping of the microrelief specific to instabilities, including tensile cracks, slip steps, microdepressions and areas of displaced material accumulation. This information is crucial for the precise delimitation of risk areas and for the design of interventions.

The study reconfirmed the fundamental role of hydrological factors in accelerating instability processes. Water infiltration, facilitated by the extensive crack system and the degradation of the collection ditches, lead to an increase in pore pressures and a reduction in the shear strength of clay materials. This complex interaction between natural (geology, geomorphology, hydrology) and anthropogenic (slope changes, infrastructure) factors underlines the need for a holistic approach to risk management.

Keywords: *GNSS system, landslides, LiDAR, infiltrations, monitoring program*

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GEOSPATIAL DATA ACQUISITION AND DATABASE STRUCTURING FOR UTILITY NETWORK CADASTRE IN AN URBAN AREA

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Abstract: *This paper presents a technical workflow for developing a cadastral information system for urban utility networks in the Gheorgheni district of Cluj-Napoca, Romania. The study targets four network classes - water supply, sewerage, natural gas, and electric power - and focuses on the integration of field surveying, spatial database structuring, and thematic mapping in a single operational framework. Spatial data acquisition was carried out using GNSS observations, total station measurements, and the combined traverse-radiation method to determine the planimetric and altimetric position of visible utility elements and related technical features.*

The processing stage included coordinate computation, drafting of technical-edilitar plans, creation of thematic layers, topology building, centroid generation, and attachment of descriptive attributes in AutoCAD Map 3D. The proposed data model links geometric entities with technical attributes such as material, diameter, number of service connections, inspection-related information, and network-specific operational characteristics. In addition, external databases were connected to the mapped entities to enable bidirectional queries between cartographic objects and tabular records.

The resulting prototype supports fast retrieval, visualization, and thematic interrogation of utility-network information and can assist maintenance planning, infrastructure coordination, and urban management. The case study indicates that integrating geodetic measurements with GIS-based cadastral data structures improves data consistency, traceability, and update capacity, while providing a scalable basis for future 3D utility modelling and digital urban-infrastructure management.

***Keywords*:** *cadastral information system, GIS, GNSS surveying, thematic mapping, urban utility networks, utility cadastre*

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EVALUATION OF THE PHYSICO-CHEMICAL PARAMETERS OF WATER IN THE LAKES OF BOCICOIU MARE

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Abstract: *The objective of this study was to evaluate the water quality status of three lakes located in Bocicoiu Mare, Romania, near the Tisa River. The chemical characteristics and potential pollution levels of these water resources were assessed through the measurement and analysis of nine physicochemical parameters. The water quality of the lakes in Bocicoiu Mare was analyzed by monitoring the primary physicochemical indicators: electrical conductivity, pH, dissolved oxygen, turbidity, and the concentrations of ammonium, nitrates, chloride ions, water hardness, and alkalinity. The applied analyses and results obtained helped identify the potential effects of both anthropogenic activities and natural factors on water quality. The studied waters exhibit signs of potential contamination that could pose risks to human health if consumed directly or indirectly through the food chain. The findings indicate that the chemical composition of the investigated lake surface waters is influenced by both geogenic processes and anthropogenic pressures. This research contributes to a better understanding of the mechanisms affecting water quality and provides valuable insights into the protection, management, and sustainable conservation of natural water resources.*

Keywords: *biodiversity, surface water, turbidity, physico-chemical parameters, environmental impacts*

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INCREASING THE ENVIRONMENTAL MONITORING CAPACITY OF AREAS OF FORMER MINING EXPLOITATIONS IN NORTHWESTERN ROMANIA BY DESIGNING AN INTEGRATED MONITORING MODEL IMPLEMENTED ON A GIS PLATFORM

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Abstract: *The closure of mines in northwestern Romania has brought a series of problems regarding the long-term effects of mining on the environment, problems that remain unresolved. The main environmental effects of mining have been reflected on the lands above or near former underground mining sites. This paper analyzes the opportunity and possibility of increasing environmental monitoring capacity in former mining areas in Northwestern Romania, by designing an integrated monitoring model implemented on a GIS software platform. The general objective of the paper is to propose an integrated model for increasing environmental monitoring capacity in former mining areas in northwestern Romania by reducing degradation and disaster risk, improving the environment through an active integrated monitoring system. A central element of the project is the integration of all data into a dynamic GIS database, structured into thematic layers and supported by specialized software platforms (e.g., ArcView/ESRI) and permanent updating, constituting an active GIS platform. The software component includes the creation of a mining database, establishing the structure and management system, implementing monitoring software on the GIS platform, loading data, and forming the GIS Mining Data Bank. The system allows continuous data updating, identification of critical areas, placement of monitoring stations, and real-time risk assessment. Furthermore, the project includes the development of an online platform for interdisciplinary collaboration and dissemination of results. The paper raises an alarm regarding the lack of concern in determining the danger posed by former underground mines in Maramureș County, concerning surface movements and pollution. The subsidence effects produced on the surface by the frequent underground voids in the area (Figure 1) of the Săsar-Valea Borcutului Mining Field were chosen as a case study. By implementing this technical-managerial model, the project contributes to substantiating decisions regarding the sustainable management of affected mining areas and increasing their resilience to natural and anthropogenic hazards.*

Keywords: Environmental monitoring, GIS integration, Subsidence, Residual pollution, Climate change, Mining hazards, Risk assessment.

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GEOSPATIAL TECHNIQUES AND WEBGIS APPLICATIONS FOR THE ANALYSIS AND VISUALISATION OF WETLANDS IN MARAMUREȘ LAND

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Abstract: *Wetlands are essential components of the landscape, with critical functions in maintaining biodiversity and regulating hydrological regimes. Increasing anthropogenic pressures and environmental change make their monitoring necessary through rigorous scientific methods and modern communication tools. In this context, the study aimed to identify the spatial patterns of wetlands in Maramureș Land using descriptive and inferential statistical methods, while also highlighting the role of WebGIS applications in the visualisation and communication of scientific results. The methodological approach was based on the exploratory analysis of spatial data in a GIS environment, with the aim of identifying distribution patterns, clustering tendencies, and proximity relationships. The analytical component was complemented by the use of WebGIS technologies and interactive multimedia applications designed to enhance the presentation of results through maps and interfaces that facilitate rapid access to relevant information. The results showed that wetlands in Maramureș Land do not display a random distribution, but rather a heterogeneous spatial structure characterized by clustering tendencies and marked territorial disparities. These results revealed clear territorial differences and confirmed the usefulness of the statistical approach for understanding the spatial structure of wetlands. The study emphasizes the value of combining spatial analysis techniques with modern visualisation and communication tools to support wetland monitoring and management, as well as dialogue among the scientific community, local stakeholders, and the general public in a regional and cross-border context.*

Keywords: *GIS, Maramureș Land, spatial statistics, WebGIS, wetlands*

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LAND USE PLANNING AND LANDSLIDE RISK MITIGATION THROUGH THE INTEGRATION OF 3D CADASTRE AND UNDERGROUND INFRASTRUCTURE

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Abstract: *Urban planning in landslide-prone areas requires the integration of geotechnical factors, land administration systems and the increasing complexity of underground structures. The rapid vertical and subsurface expansion of urban environments, including transport tunnels, utility networks and underground facilities, introduces significant challenges for land use planning, particularly in unstable slope areas. Ground excavations, modifications of drainage systems and additional structural loads may either trigger or stabilize landslides, highlighting the need for integrated planning tools that consider both risk and legal constraints.*

This study proposes a conceptual and methodological framework aimed at ensuring consistency between landslide risk assessment, spatial planning and land administration processes. The approach integrates three key components: geotechnical and geomorphological data used in 3D/4D landslide modelling; a 3D cadastre system representing property rights, restrictions and responsibilities in volumetric space; and the mapping of underground infrastructure as both exposed elements and planning constraints.

The methodology is based on the analysis of international best practices in countries with advanced 3D cadastre and subsurface management systems. It introduces an interoperable GIS–BIM–CityGML workflow that integrates spatial, infrastructural and cadastral data using standardized models. The framework also defines the minimum required dataset and essential geometric and legal attributes necessary for cadastral objects, supporting zoning regulations and planning restrictions in landslide-affected areas.

The results demonstrate that the integration of 3D cadastre with geotechnical risk assessment and underground infrastructure modelling enhances the accuracy of property documentation, reduces spatial conflicts and supports transparent decision-making processes. Furthermore, volumetric representation of land parcels and subsurface structures enables more detailed analysis and improved management of landslide risks. Overall, the proposed approach contributes to sustainable urban development by supporting risk-informed planning and increasing resilience in dynamically evolving geological environments.

Keywords: *3D cadaster, GIS–BIM integration, land use planning, landslides, subsurface infrastructure*

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INTEGRATING TRADITIONAL IN-SITU ECOLOGICAL SURVEYS WITH LIDAR REMOTE SENSING TECHNIQUES IN HELP FOR DEVELOPING ADAPTATIVE MANAGEMENT STRATEGIES IN CONSERVATION OF WETLAND HABITATS

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Abstract: *This study investigates wetland ecosystems through the integration of in situ methodology and LiDAR-based remote sensing techniques. Wetlands are ecosystems vulnerable to climate change, making accurate monitoring of species distribution essential for effective conservation. The main objective of this research is to understand the influence of climate change on species density and spatial patterns, as well as to support the development of well-informed management plans for the administrators of protected natural areas. Field data were collected through direct observations and systematic sampling in order to identify and quantify species presence within the study area. These in situ measurements were complemented by LiDAR scanning and high-resolution photogrammetry, which provided detailed information on vegetation structure, topography, and spatial heterogeneity. The datasets were integrated to generate species density maps and to analyse distribution patterns within the wetland ecosystem. The results show that integrating field observations with LiDAR data significantly improves non-invasive data collection methods, while the spatial resolution of the resulting aerial images enhances the accuracy of species density estimation. In addition, the analysis highlights distinct spatial patterns and variations that may be associated with environmental changes, including the interpenetration of related habitats, as well as changes in hydrological regimes and vegetation structure. These findings emphasize the effectiveness of combining traditional ecological methods with advanced remote sensing technologies for monitoring dynamic wetland ecosystems. The study provides relevant insights into the impact of climate change on biodiversity and constitutes a scientific basis for the development of adaptive management strategies aimed at preserving the integrity of protected ecosystems.*

Keywords: *climate change, wetlands, Maramureș, biodiversity, habitats*

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INTEGRATED MONITORING OF CARPATHIAN WETLANDS USING MULTI-SOURCE DATA AND GIS-BASED ANALYSIS

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Abstract: *Wetlands provide essential ecosystem services, including water regulation, biodiversity support, and climate change mitigation, yet they are increasingly threatened by hydrological alterations, climate variability, and insufficient monitoring systems. This study aims to develop and implement an integrated monitoring framework for wetlands of international importance in the Carpathian region within the WeVaRe project. The approach is based on the integration of multi-source data, including hydrological measurements (water levels, flow, and water quality), meteorological and climatological parameters (temperature, precipitation, evapotranspiration), and remote sensing products derived from Sentinel-1 and Sentinel-2 satellite imagery, digital elevation models, and spectral indices such as NDVI and NDWI. All datasets were subjected to rigorous quality control procedures, including homogeneity testing, outlier detection, and gap-filling methods, and were subsequently integrated into a GIS-based database enabling advanced spatio-temporal analysis and modeling. The results highlight significant seasonal variability in water levels, soil moisture, and vegetation dynamics in the studied wetlands (Tăul lui Ciumau and Iezeru Mare), with clear correlations between climatic conditions and ecosystem responses. Furthermore, multi-criteria GIS models in ArcGIS Pro allowed the identification of areas exposed to risks such as flooding, drought, and land degradation, improving the spatial accuracy of environmental assessments. The integrated monitoring system enhances the understanding of wetland dynamics and supports the development of predictive scenarios under changing climate conditions. These findings provide a robust scientific basis for adaptive wetland management, facilitating data-driven decision-making, conservation planning, and cross-border environmental cooperation. The proposed framework demonstrates the added value of combining remote sensing, in-situ observations, and GIS technologies for sustainable wetland monitoring and management.*

Keywords: *climate variability, GIS, remote sensing, risk assessment, water monitoring, wetlands*

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ASSESSMENT OF THE QUALITY OF GROUNDWATER FROM WELLS IN LELEI VILLAGE, SATU MARE COUNTY, ROMANIA

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Abstract: *The quality of water from individual wells is essential for public health in rural communities. This study evaluated the quality of groundwater from wells in Lelei, Satu Mare County, Romania, by determining physicochemical indicators (pH, electrical conductivity, turbidity, nitrates, nitrites, and iron) and microbiological indicators (coliform bacteria and Escherichia coli). The values determined were 2.28–45.01 mg/L for nitrates, 0.006–0.054 mg/L for nitrites, 23–130 µg/L for iron, 0.54–2.70 NTU for turbidity, 6.8–7.4 for pH, and 1107–2340 µS/cm for electrical conductivity. Coliform bacteria and Escherichia coli were not detected in any of the samples (0 CFU/100 mL). All parameters analyzed were within the values required by applicable legislation, indicating good water quality and the absence of fecal contamination. The results support the need for periodic monitoring of individual water sources.*

Keywords: *groundwater, wells, water quality, physico-chemical parameters, Escherichia coli, nitrates*

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THE EFFECTS OF CLIMATE CHANGE ON WETLANDS WITH A FOCUS ON PEATLANDS

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***Abstract**: Wetlands are vital ecosystems for the biosphere, but they rank among the most critical and vulnerable ecosystems on Earth. Climate change influences and affects wetlands through several factors, the main ones being: rising temperatures – a phenomenon that accelerates the decomposition of organic matter and increases carbon dioxide and methane emissions; alterations to the hydrological regime – which critically affects wetland functioning, as lowering water levels can transform these ecosystems from carbon sinks into emission sources; and extreme climatic events – which affect ecosystem structure and can cause irreversible degradation. Peatlands are among the wetlands most affected by climate change. The aforementioned stressors can push peatlands beyond critical tipping points, transforming them from long-term carbon sinks into net sources of greenhouse gases, thus creating dangerous positive feedback loops that amplify global warming. This paper examines the effects of climate change on wetlands, with a specific focus on peatlands, highlighting both vulnerabilities and feedback mechanisms.*

Keywords: *climate change; wetlands; peatlands; carbon; hydrology; ecosystems*

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CRITICAL ANALYSIS OF THE MANAGEMENT OF HAZARDOUS VETERINARY WASTE GENERATED IN VETERINARY CLINICS IN MARAMUREȘ COUNTY, ROMANIA

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Abstract: *Hazardous veterinary waste, although representing a small proportion of the total waste generated in veterinary clinics, poses a significant risk to public health and the environment due to its infectious, chemical and pharmaceutical potential. Its management requires strict compliance with legislative requirements regarding collection, temporary storage, transport, traceability and final disposal. This study aimed to critically evaluate the hazardous veterinary waste management system in veterinary clinics in Maramureș County and to identify the key areas requiring improvement. The analysis highlighted that 87% of the practices investigated benefit from regular collection services for hazardous veterinary waste, and 98% use compliant containers for their collection. However, deficiencies were identified regarding waste traceability, the consistency of record-keeping and data reporting, and variations in the implementation of waste management procedures. The study results highlight the need to standardize management practices, strengthen monitoring and traceability systems, and organize periodic training programs for personnel responsible for veterinary waste management. The implementation of these measures can enhance compliance with laws and reduce risks to human health and the environment.*

Keywords: *veterinary hazardous waste, hazardous waste management, contamination, veterinary clinic*

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NGO PERSPECTIVE - RESPONSIBLE MANAGEMENT OF MINERAL RESOURCES IN ROMANIA: FROM MINING LEGACY TO SECONDARY RAW MATERIALS AND SUSTAINABLE DEVELOPMENT

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Abstract: *Romania has a long mining tradition and significant geological potential for metallic, non-metallic and energy mineral resources. At the same time, decades of mining activity and subsequent mine closure have left numerous waste dumps, tailings impoundments, abandoned underground workings and contaminated areas requiring long-term environmental management. This paper analyses the current challenges associated with responsible mineral-resource management in Romania and discusses the transition from a conventional mining-waste perspective towards the concept of secondary mineral resources. The analysis integrates information provided by Go Green Resources NGO (https://gogreenresources.ro/) with European environmental and raw-material policies and selected scientific literature concerning mining waste, acid mine drainage and resource recovery. Particular attention is given to the mining regions of Maramureș and the Apuseni Mountains, where historical mining activities generated significant quantities of potentially reactive residues. These materials may simultaneously represent environmental liabilities and potential sources of metals and critical raw materials. A sustainable management framework is proposed based on four complementary components: characterization and environmental risk assessment, geospatial and continuous monitoring, selective recovery of valuable materials, and progressive remediation and land-use planning. The approach emphasizes that resource recovery should not replace environmental protection but should be integrated with it. The results indicate that the future management of Romania's mining legacy requires multidisciplinary cooperation between mining engineers, geologists, environmental specialists, authorities, local communities and industry. Such an approach may contribute to reducing environmental risks while supporting circularity and the responsible utilization of domestic mineral resources.*

Keywords: *mineral resources; mining waste; tailings; secondary raw materials; critical raw materials; acid mine drainage; environmental monitoring; sustainable mining; Romania; circular economy*

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