



A XXIX-a Ediție a Simpozionului Internațional de SIG
- BACKUP EDITION -

BOOK OF ABSTRACTS

In memoriam Prof. Univ. Emerit. dr. Ioan DONISĂ

30 martie 2023, Iași

Impactul potențial al schimbărilor climatice asupra proceselor de eroziune în suprafață a solului în România

Patriche Cristian Valeriu¹, Roșca Bogdan¹, Pîrnău Radu Gabriel¹, Irimia Liviu Mihai², Vasiliniuc Ionuț³

1. Academia Română Filiala Iași Centrul de Cercetări Geografice, Romania

2. Universitatea de Științe Vieții Ion Ionescu de la Brad, Romania

3. Universitatea Alexandru Ioan Cuza, Romania

patriche.cristian@acadiasi.ro, rosca.bogdan@acadiasi.ro

radu.pirnau@acadiasi.ro; liviuirimia2005@yahoo.fr

vasiliniucionut@yahoo.com

In contextul schimbărilor climatice, eroziunea solului manifestă, alături de alte procese geomorfologice, modificări cantitativ-calitative, induse de dinamica spațio-temporală a factorilor de control. Studiul de față își propune să realizeze o serie de previziuni privind evoluția posibilă a ratelor de eroziune în România, în diferite scenarii de schimbări climatice. Studiul aplică modelul RUSLE în cadrul GIS pentru evaluarea eroziunii actuale. Evoluția probabilă a erozivității pluviale este estimată pe baza indicelui Fournier modificat, calculat, la rândul său, în funcție de precipitațiile medii lunare estimate pentru viitor, pentru două perioade de timp (2041-2060 și 2061-2080) și pentru două scenarii de evoluție a dioxidului de carbon, respectiv RCP 4.5 și 8.8. Prin integrarea erozivității pluviale estimate pentru viitor cu ceilalți factori de eroziune, s-au obținut modelele spațiale ale eroziunii pentru viitor. Acestea arată că, sub influența schimbărilor climatice, ratele de eroziune tend să crească în următoarele decenii la nivelul României. Pe ansamblu, această creștere este prognozată pentru 84-90 % din teritoriu. În cea mai mare parte, ratele de eroziune vor crește cu cca 1 t ha-1 yr-1. Local însă, această creștere poate depăși 5-10 t ha-1 yr-1 pe o suprafață estimată la peste 8000 km2. Cele mai afectate vor fi solurile din regiunile de deal și podiș, unde impactul negativ asupra fertilității va fi cel mai semnificativ.

This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CNCS - UEFISCDI, project number PN-III-P4-PCE-2021-1350, within PNCDI III.

Utilization of satellite images for identification and planning river renaturation measures. Case study – the Camenca River

Jeleapov Ana

Institute of Ecology and Geography (Moldova State University), Chișinău, Republic of Moldova
anajeleapov@gmail.com

The study is dedicated to analysis of satellite images in order to identify and plan the measures for renaturation of rivers and streams from the Camenca river basin. Rivers hydromorphological alteration is caused by construction of dams and reservoirs on river streams, of a large number of canals, including Balatina-Prut, flood protection dykes in the floodplain as well as rivers training, especially in the lower part. Main measures to be taken for improvement of rivers hydromorphological conditions from the Camenca river basin are divided into those related to longitudinal continuity as well as of floodplain conditions. According to satellite images, 378 dams are constructed on river streams (with length over 2,5 km). 51 of them are partially demolished and can be the first in the list of river renaturation measures. The upstream part of the dams is reservoir or pond only in case of 58%, other conditions are: 24% - dry land, 8% - wetlands, 6% - eutrophic water accumulations, 4% - semidry ponds. One of the most important measures is restoration of hydrological link between the middle and lower part of the Camenca river by demolishing the canal Balatina-Prut. Another important measure refers to restoration of natural shape of Camenca river. The natural riverbed is well visualized on free satellite images and can be mapped and subsequently identified in the field for restoration. In this regard, it was calculated that the trained river length is about 17 km, while mapped natural river is 27 km. Thus, the real length of Camenca was reduced by at least 10 km. An important measure refers to the establishment of river protection zones and the planting of protection strips with certain trees. Modelled protection zones area is about 6425 ha, of which 2700 ha is specific for Camenca river itself, 2500 ha for small rivers (length of 10-100 km), and 1227 ha for streams (length of 2,5-10 km). Also, it was identified that main land cover from modelled protection zones is grassland – 71%, followed by arable lands – 8%, settlements – 7%, forests – 6%, wetlands – 6%. The protection of rivers and the restoration of their beds is the basic strategy for improving the state of the environment and the sustainable use of its resources.

Application of GIS-based relief analysis for habitation characterization during the Late Bronze Age in the heterogeneous landscape of northeast Romania

Mihu-Pintilie Alin¹, Brașoveanu Casandra¹, Stoleriu Cristian Constantin²

1. Institute of Interdisciplinary Research, Department of Exact and Natural Sciences, "Alexandru Ioan Cuza" University of Iași, Romania

2. Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

mihu.pintilie.alin@gmail.com;
brasoveanu.cassandra@gmail.com; cristoan@gmail.com

Over the last few decades, the development of new GIS-based computer algorithms, automated relief analysis tools, and free access to datasets have attracted the attention of researchers to study the morphology of the Earth's surface for various purposes. For instance, the automated extraction of geomorphological settings using geoinformatics techniques has become a crucial aspect of present environmental analysis and paleo landscape modelling efforts. Moreover, morphological data obtained from highly accurate digital elevation models (DEMs), such as LiDAR-derived DEMs, can provide valuable information related to landscape modelling and landform classification processes. In geoarchaeological investigations, the different types of landforms ranging from large-scale features such as plains and mountains to local topography such as small hills and valleys, play a significant role in human behavior, particularly in terms of habitation practices. Therefore, in this work, we aimed to apply an automated GIS-based landform classification method to characterize the relief of over 350 Late Bronze Age (LBA) settlements belonging to the Noua Culture (NC) (cal. 1500/1450-1100 BCE) located in northeast Romania. For this purpose, we used an adapted version of the Topographic Position Index (TPI) methodology developed by Weiss A.D. and implemented as an extension for ESRI ArcView 3.x. by Jenness J., which we abbreviated as DEV. This approach involved two steps: (i) applying the standard deviation of TPI for the mean elevation (DEV) around each LBA site analyzed (1000 m buffer zone) and (ii) classifying the archaeological site's location using six slope position classes (first method) or ten morphological classes by combining the parameters from two small-DEV and large-DEV neighborhood sizes (second method). Our findings suggest that the populations belonging to the Noua Culture preferred to establish their settlements on hilltops close to steep slopes and/or on the small hills located in large valleys, indicating a strong connection between the landform patterns and habitation practices during the Late Bronze Age. From the perspective of the GIS-based methodology applied in this study, the automated relief analysis using TPI-based DEV combined with LiDAR-derived DEMs and other geomorphological variables (e.g., terrain slope) can be easily integrated into various geoarchaeological studies due to its great applicability. Furthermore, the TPI-based DEV techniques bring many improvements to conventional geoarchaeological surveys: the fast and low-cost performance of relief analysis at both small and large scales, the ability to divide the landscape into ten landform classes and replicate the analysis for various archaeological contexts, and the ability to describe prehistoric human behavior based on certain geographical datasets. Additionally, the outcomes contribute to archaeological predictive modelling in the heterogeneous landscape of Northeast Romania.

Application of satellite data in Institute of Ecology and Geography of Moldova

Bunduc Tatiana, Cantir Angela, Crivova Olga, Chiriac Ioana

Institute of Ecology and Geography (Moldova State University), Chișinău, Republic of Moldova
ioanna.chiriac@gmail.com; tatiana.i.popusoi@gmail.com
angelamadan87@gmail.com; skoiatollo@gmail.com

The interpretation of aerial photographs in Republic of Moldova has been carried out since the 70s. Today in Institute of Ecology and Geography (State University of Moldova) remote sensing satellite images are proving useful in three scientific research areas: Landscape geography, Geomorphology and Ecopedology, Climatology and Environmental Risks. Helpful problem-solving techniques of satellite imagery processing include: land cover classification, thermal modelling and digital elevation model generation (DEM). The data gathered by Sentinel-2 satellites were used to detect categories of land and to create DEM. The following programs were used for data management: SNAP, ArcGIS Software, Erdas Imagine and QGIS. Results obtained through the above mentioned methods allow researchers to thoroughly investigate land use and cover change (LUCC), to detect exogenous processes manifestations, to understand land-use impacts on landscape stability and to study climate change. These studies are very important, because there is a significant demand for regular studies of hazardous exogenous processes in Republic of Moldova. The study aims to describe and to analyze the algorithms of Remote sensing data processing in laboratories of Institute and to propose new research directions using high resolution satellite imagery. For example, satellite images can be used to determine shifts in ecological activity, like a swampland drying up, lakebed flooding, seasonal variation of water storage in river basins or river bed erosion. Also, such advanced approaches can be become of the basis for establishing an effective mechanism for monitoring of statewide exogenous geological processes. It is concluded that Satellites and other remote sensing tools offer new ways to study ecosystems. MODIS is playing a vital role in the development of validated, global, interactive Earth system models able to predict global change accurately. The technological prowess of Copernicus, especially in terms of availability and accessibility, has made Copernicus the largest space data provider in the world.

Preliminary results of Big Data analysis for Iași, Romania

Popescu Alexandru-George, Rusu Alexandru, Groza Octavian

Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

algepopescu@gmail.com;
saintcloud_2000@yahoo.com; grozaoctavian@yahoo.fr

The city of Iași is one of the most visited cities in Romania, known for its rich cultural heritage and historical landmarks. In this context, analyzing big data from reviews of the main tourist attractions and the transportation system can provide valuable insights to stakeholders such as the local government, tour operators, and transport companies. The first step in the analysis is data collection. Reviews from various online platforms such as Google Reviews or blogs are gathered and preprocessed for further analysis. This includes data cleaning, removal of irrelevant data, and categorization of reviews into different segments based on the type of attraction or transportation system. Once the data is collected, the analysis begins with exploratory data analysis to gain insights into the reviews' overall sentiment, distribution, and frequency. This is followed by text mining techniques such as sentiment analysis, topic modeling, and clustering to extract valuable information from the reviews. The sentiment analysis can help understand the visitors' overall sentiment towards the main attractions and transportation system in the city. This includes identifying the positive and negative aspects of each attraction and transportation mode. The results can be used to improve the visitor experience by focusing on the areas with negative sentiment. Topic modeling can help identify the most frequent topics discussed in the reviews, such as the quality of service, accessibility, and cleanliness. The topics can be used to identify areas that need improvement or highlight the strengths of the city's main attractions and transportation system. Clustering techniques can group reviews based on their similarity, allowing the stakeholders to identify patterns in the data that can help improve the tourist experience in the city. For example, reviews related to accessibility can be clustered together, and recommendations can be made to improve accessibility for tourists. The analysis can also be extended to identify trends over time. By collecting and analyzing data over a period, stakeholders can identify seasonal variations, changes in tourist preferences, and evaluate the effectiveness of previous improvements.

Mapping the damage caused by extreme phenomena on fruit-growing regions in the north-east of Romania using remote sensing methods

Jitariu Vasile¹, Istrate Vasilica², Ursu Adrian¹, Niacsu Lilian¹

1. Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

2. S.C. Intervenții Active în Atmosferă S.A., Bucharest, Romania

vasilejitariu@yahoo.com; istratevasile87@gmail.com

ursu_v_adrian@yahoo.com; lilianniacsu@yahoo.com

Extreme climatic phenomena such as strong winds or hail can pose immediate threats to agricultural crops, and the damage that can occur, depending on the phenophase of the crop, can be significant. The consequences of annual crops manifest themselves over the course of the year, whereas the consequences of polycarpic species (vineyards, orchards) can extend over a longer period of time. In the summer of 2021, a series of storms with heavy winds and hail were noticed over a fruit-growing region in NE Moldova (Romania), causing damage to over 400 ha. These phenomena overlapped during fruit ripening (approximately one month before picking), but the damage was not only to the fruits, but also to the trees in the young plantations, with injuries occurring on the tree trunks. In this case study, the extreme meteorological phenomena will be outlined using gridded data (ERA5) and images with the kinetic energy of the cell that manifested itself over the study area. Given that the state of the vegetation can be tracked using satellite images (via indices that monitor chlorophyll activity), the purpose of this study is to highlight the areas affected by extreme phenomena using satellite remote sensing and GIS techniques.

Using the positive openness of topographic openness to semi-automatically extract gullies from LiDAR digital elevation models

Codru Ionut-Costel¹, Niacsu Lilian², Enea Andrei²

1. RECENT AIR - Laboratory of interdisciplinary research in geo-chemistry of rural areas, Mădăjac, Faculty of Geography and Geology, "Alexandru Ioan Cuza" University of Iași, Romania
2. Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

codruionutcostel@gmail.com

lilianniacsu@yahoo.com; andenea@gmail.com

The automatically mapping of the areas affected by gullies in the Moldavian Plateau was carried out using an 1 meter resolution per pixel LiDAR digital elevation model, and the Topographic Openness index module offered by SAGA GIS software, through QGIS software, in order to measure the total surface affected by this phenomenon in the Moldavian Plateau, eastern Romania. This research discusses the concept of topographic openness and how it can be used to extract gullies. Topographic openness can be viewed from two different visual perspectives: positive openness and negative openness. Positive openness is determined by the average zenith angle, while negative openness is determined by the average nadir angle. The nadir represents the point on the terrain that is most protected from the elements and surrounded by terrain features that obstruct the view of the sky. The radius used to calculate zenith and nadir angles is dependent on the topographic features being emphasized. Using low values for search radius and the nadir point, gullies can be extracted semi-automatically from LiDAR digital elevation models.

Evaluation and analysis of the intensity of late frosts on the territory of the Republic of Moldova using Geographic Information Systems (GIS)

Botnari Aliona

Institute of Ecology and Geography (Moldova State University), Chișinău, Republic of Moldova
lionkabotnari@gmail.com

For the territory of the Republic of Moldova, where agriculture has a significant share in the national economy, the study and analysis of unfavorable phenomena is very important. Agricultural crops are directly dependent on the climatic conditions, which determine the progress of the productive process. Among the limiting factors are the dangerous frosts that occur outside their characteristic season, causing damage for agricultural crops. It should be noted that for the territory under study, until now, ample information on the distribution in time and space of the intensity of dangerous spring frosts is missing. The climate guidelines contain the data that reflect the time of manifestation and the intensity of frosts, but without specifying the spatio-temporal distribution of this phenomenon under the influence of local climatic factors, which, in turn, are determined by the features of the relief. These arouse interest, because knowing the intensity of dangerous frosts, (distribution in time and space) that manifests itself during the period of active vegetation of agricultural crops can compromise the fruit even in proportion to 80%. The purpose of this study is to evaluate in space and time the intensity of dangerous frosts on the territory of the Republic of Moldova using the possibilities offered by the GIS software. The regression equations obtained show us the relationship between the intensity of dangerous frosts and the geographical latitude, the geographical longitude or the absolute altitude of the place. The use of GIS software offers the possibility for spatial analysis (over the entire territory of the Republic of Moldova) of the intensity of dangerous frosts in the spring and the evaluation of local geographical factors. In conclusion, it can be mentioned that on the territory of the Republic of Moldova, the intensity of dangerous frosts in the spring, may vary within -0.1°C and -4°C , and this manifestation takes place during the period of active vegetation, which leads to the injuries of agricultural crops and the reduction of productivity. The use of GIS in analysis allows such analysis to be carried out for territories of different sizes, different forms of relief, etc.

Professor DHC Ioan Donisă, the initiator of the SIG international symposium

Paraschiv Viorel

Economic High School of Tourism, Iași, Romania

paraschiv03@gmail.com

Professor Ioan Donisă was a promoter of physical-geographic research through aerial images (remote sensing) and later GIS in Romania. The GIS Symposium was a special initiative in the scientific world through the openness, communication and cooperation of Romanian specialists from both banks of the Prut.

Geo-spatial analysis, applied for identifying optimum locations for scenic viewpoints. Case study: Suceava county, Romania

Enea Andrei, Azoitei Cătălina-Elena, Ciubotariu Oana-Letiția, Cuvuliuc Andrei, Olariu Andrei-Cosmin, Ursu Denisa-Elena, Vieru Gabriela-Alexandra

Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

andenea@gmail.com; catalinaazoitei@yahoo.com

oanaletitia99@gmail.com; cuvuliucandrei@gmail.com

olariuandreicosmin@yahoo.com; denisaursu47@yahoo.com

alexandravieru40@yahoo.com

The most recent geographic approaches concerning spatial and temporal processes and phenomena have almost exclusively utilized GIS or remote sensing techniques. This has allowed to quantify with high accuracy intermediate and final layers. The study of qualitative subjects, such as scenic viewpoints, encompasses several challenges. The current study addresses the tourists need to visit places with maximum scenic potential. Methodologically, this is achieved by applying a multi-criteria analysis, involving multiple relevant spatial layers, resulting in a comprehensive distribution of several classes of different degrees of location suitability for placing viewpoints for sightseeing. Firstly, by means of web scraping techniques, a database of current viewpoints was created based on specific keywords for the entirety of Romania and curated manually. Secondly, a survey was applied in order to assess the final geoformula weights, scores regarding each parameter and more thoroughly quantify qualitative parameters. Subsequently, the scores were associated in table form to each underlying layer and converted into raster form in order to generate the final layer, depicting the optimum theoretical location for placing scenic viewpoints. The study area consists in Suceava county due to scenic diversity purposes, strong tourist branding and data availability. The results reveal a spatial distribution and comparison of appropriate locations for scenic viewpoints correlated to the physical and anthropogenic landscape factors taken into account. Therefore, such distributions, especially when related to slope, road or trail accessibility, vegetation cover, geology etc. can aid in distinguishing representative areas for tourist promotion projects or even in future strategies for funding redirected towards developing rural or urban regions, from a touristic perspective.

The system of cartographic work as an important part of college geographical education

Tumanov Dmitri

Faculty of Geography, "ION CREANGĂ" State Pedagogical University of Chișinău, Republic of Moldova

dumitрутumanов87@gmail.com

The specificity of geography lessons as a school subject lies in the fact that a necessary condition for its successful assimilation is the ability to use various sources of information to obtain geographical knowledge, and one of the first in the list of such sources is a geographical map. Today, general geographic maps are among the main types of cartographic products that determine the accuracy and modernity of small-scale general geographic and thematic maps. The problem of student-centered learning is extremely relevant for modern pedagogy. Working with geographical maps replaces the direct study of countries and other territories on the surface of the Earth by students, helps them to recreate the image of the studied territories with their main characteristic features. Analyzing the content of the cards and comparing them, students use and develop techniques of logical speech and spatial figurative thinking: they establish connections between phenomena, make comparisons, identify cause-and-effect relationships, bring common concepts under common ones, generalize, etc. Most of the independent work of students at school, including creative ones, is based on maps. Geographic maps help to connect learning with life, for example, in the form of compiling local history maps, maintaining a "duty map" of one's republic or the world. One of the necessary skills that needs to be trained and developed in a young graduate is systemic thinking, which means the practice of conscious thinking in understanding and implementing the connection between the constituent parts of a concept, process, phenomenon, system. Teaching aids are created taking into account the goals of geographical education, its content, as well as modern requirements for methods of teaching geography. They should be adapted to the characteristics of the activities of students and teachers and contribute to the best mastery of knowledge and skills with the least expenditure of time and energy. It is advisable to base the classification of teaching aids on the principle of grouping them according to the method of depicting geographical objects and phenomena, since the subject of school geography is the study of real objects and phenomena and spatial-territorial systems. Teaching tools in the framework of the study of geography contribute to the formation of specific ideas and scientific geographical concepts about natural and economic objects and phenomena. One of them is the description and depiction of objects and phenomena by conditional means (words, signs, numbers): a) verbal (textbooks, reference books, notebooks on a printed basis, text tables, anthologies); b) cartographic aids (wall, table and contour maps, chart maps, etc.); c) graphical schematic aids (structural and classification schemes, schemes of connections and interrelations of natural and economic objects and phenomena). The teaching aids of this group serve the purposes of forming geographical representations, revealing the essence and structure of objects and phenomena, the features of their spatial and territorial distribution; they help the assimilation of theoretical knowledge.

Cartography to the rescue: Using cartographic approaches to boost a national tourism brand

Stoleriu Oana Mihaela¹, Ibănescu Bogdan-Constantin², Stoleriu Cristian Constantin¹, Lupu Cristina¹

1. Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

2. Centre for European Studies, Faculty of Law, Alexandru Ioan Cuza University, Romania

oana_smadici@yahoo.com; ibanescudam@yahoo.com

cristoan@yahoo.com; cristinalupu888@yahoo.com

One of the most dynamic and creative sectors of international tourism during the past three decades was represented by the international promotion. In their search for innovative approaches that could attract vast fluxes of tourists, many destinations have bid on national and regional promotional brands based on characters, places, or buildings promoted through movies and TV series. This ensured a global-wide distribution and endorsement of the brand, given the already existent media content. One of the most notorious tourism brands based on fictional works is represented by Dracula and its various derivations. Benefiting from a constantly expanding coverage on entertainment channels, Dracula became widely popular and strongly associated with Romanian territory. However, its capitalization by institutional and private tourism actors often lacks synergy, due to the low integration of spatial features. This is due mostly to a biased approach and appropriation of the brand at local level. While several explanations for this lack of synergy were provided, to this date very few solutions were provided. In this paper we used an original cartographic approach combining the spatial distribution of Dracula attractions and online data regarding tourist behaviour in order to set up a decision-making toolkit for the enhancement of brand management. The results confirm the existence of a spatial pattern in the distribution and differentiation of Dracula attractions which, consequently, affects the overall tourist behaviour and satisfaction. The results also highlight a slightly different reality from the typical routes of Dracula tours and the location of iconic Dracula heritage. The capitalisation of the fictional character, for example, is highly connected with the spatial dependency to Transylvania region and its cluster of numerous historical attractions. Based on the main findings, the paper addresses several recommendations for national and regional actors in order to upgrade the tourism management of Dracula image.

Keywords: thematic maps; Dracula; tourism brand; dark tourism; online visitor reviews

Thematic and spatial accuracy of Corine Land Cover data - Case study Iasi County, Romania

Doru Silviu, Nicușor Mihai

Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

silviudoru89@gmail.com; niculita.mihai@gmail.com

Land cover changes are the results of natural processes, such as: climate variations, volcanic eruptions, changes in river channels or sea level, etc. However, most of the land cover changes in present and from the recent past are due to human actions. CORINE Land Cover is one of the most relevant Land Use Cover (LUC) databases in Europe because of its degree of detail and long time series. In this context, it is a requisite to have data sources assurance and to provide reliability in the field through evaluating the accuracy of the databases, in order to provide a reliable indicator to the user. Viewed as a major knowledge gap, the accuracy of the data from the CLC project has been widely addressed by numerous researchers, who have analyzed the data sets to determine their degree of confidence. By comparing various data sources: orthorectified aerial images, satellite images, national data sets, field surveys, digital terrain model, and by implementing the methodologies described in specialized studies or in personal research, it was noted that CLC datasets are suitable when used with a series of limitations.

The application of landscape metrics in the analysis of land use change in the Orhei National Park

Bejan Iurie¹, Angheluța Viorica¹, Dilan Vitalie², Tîțu Pavel¹, Jechiu Iradion¹

1. Institute of Ecology and Geography (Moldova State University), Chișinău, Republic of Moldova

2. Faculty of Geography, "ION CREANGĂ" State Pedagogical University of Chișinău, Republic of Moldova

iracie.bejan@gmail.com; dilan.vitalie@gmail.com

This study aims to investigate the structure and changes in land use from the borders of the Orhei National Park (ONP). ONP is located in the central part of the Republic of Moldova, 90.7% of its surface being located in the Codrilor Plateau and 9.3% in the Dniester Plateau, being extended from west to east over an area of 338.4 km². In administrative-territorial aspect, ONP overlaps on Orhei, Călărași, Strășeni and Criuleni districts, 21 settlements are included within them (Vatici, Ivancea, Seliște, Trebujeni, Butuceni, Codreanca etc.). The varied natural conditions, with altitudes ranging from 20.8 m (minimum in Răut meadow) up to 303.1 m (Vârful Dealului hill), that conditioned the formation of a great variety of landscapes. The analysis was based on Landsat 7 and 8 satellite images for 2000 and 2018 years downloaded from <https://earthexplorer.usgs.gov/>. Six categories of land cover were identified and analyzed: water, arable, forests, grasslands, multiannual plantations and settlements. In order to estimate an optimal land use system, landscape metrics were assessed, which was carried out using the FRAGSTATS and ArcGIS softwares (with the Patch analyst and Patch Grid extensions). In the analyzed time period (2000-2018) qualitative changes have occurred in the landscape structure of the ONP: the share of forests (from 53.9% to 55.8%) and pastures (from 6.6% to 8.5%) increased; the share of arable land (from 31.2% to 28.6%) and multiannual plantations (from 3.3% to 2.3%) decreased. The water landscapes remained practically unchanged. The increase in the average size of elementary landscape units during the analyzed period contributed to reducing the degree of fragmentation, which has a positive impact on the environment. The use of landscape metrics offers many facilities in studies of landscape ecology and recommendations to improve the landscapes state.

The influence of aquatic and edge features for breeding waterfowls in Romania

Ion, Constantin¹, Jitariu, Vasile², Ignat Alina Elena¹

1. Faculty of Biology, "Alexandru Ioan Cuza" University of Iași, Romania

2. Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

costinbio@gmail.com; Silvyuj@gmail.com
alinaei@yahoo.com

The importance of aquatic and edge areas for aquatic birds is still little studied. Ten wetlands from Western Moldavia region (Romania) were studied in order to identify those features which influence breeding of waterfowls. We statistical analysed the connection between the presence of the waterfowls and aquatic characteristics and edge features in 2011 and 2012. The sinuosity of lakes and the number of habitat patches had a negative influence for birds, while the number of water bodies and marshes surface had a positive effect.

Pasture dynamics in Iași county during the last one hundred years - consequences of land-use changes and policies

**Văculișteanu Georgiana¹, Doru Silviu Costel², Necula Nicușor¹, Niculita Mihai²,
Mărgărint Mihai Ciprian²**

1. RECENT AIR - Geography and Earth Physics Laboratory, Tulnici Research Station, Faculty of Geography and Geology, "Alexandru Ioan Cuza" University of Iași, Romania

2. Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

georgiana.vaculisteanu@gmail.com; silviudoru89@gmail.com
nicusor.necula@uaic.ro; niculita.mihai@gmail.com
margarint.ciprian@yahoo.com

Land use changes are some of the main drivers of pasture dynamics. During the last 100 years, in Iași county, some historical events, especially land reforms, have shaped the actual structure of the pastures. Revealing these changes, not just as total statistics but also as fluxes and at a spatial level, allows us to detect and associate them with the factors involved. We used a raster approach to change detection for a land-use-type database that extends to the 1920s. The database was created from topographic, remote sensing, and field data collected between 1920 and 2006, with five intervals between 1960, 1980, 1990, and 2000, starting from CORINE Land Cover data. These periods mark the socio-political and natural changes in the study area. The change detection results are well-matched with the identified drivers and their spatial distribution. The fluctuations between land-use types provide an essential way to create drivers' associations. Our analysis can be easily applied to any other concerned areas and could be used as base references for any legislative intention to determine land-use-type changes because it can be learned from past conversions concerning failures or examples of good practice.

Actualizarea bazelor de date spațiale cu ajutorul aplicațiilor OpenSource destinate colectării datelor din teren

Roșca Bogdan¹, Pîrnău Radu Gabriel¹, Patriche, Cristian Valeriu¹, Vasiliniuc Ionuț²

1. Romanian Academy - Iași Branch, Geographical Research Center, Romania

2. Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

roscao@gmail.com; radupirnau@yahoo.com
pvcristi@yahoo.com; vasiliniucionut@yahoo.com

În ultima decadă, pe lângă evoluția rapidă a programelor OpenSource dedicate Sistemelor Informaționale Geografice, s-a pus accent și pe dezvoltarea componentelor mobile destinate în special colectării datelor spațiale din teren și sincronizării acestora cu programele SIG de tip Desktop. În această lucrare prezentăm comparativ două astfel de aplicații mobile, respectiv MerginMaps dezvoltată de Lutra CONSULTING și QFIELD dezvoltată de OPENGIS.ch, pentru a evidenția avantajele și particularitățile utilizării acestora în tandem cu programul QGIS și tipurile de baze de date spațiale (Postgres/PostGIS și Geopackage). Pentru evaluarea acestor aplicații, s-au utilizat dispozitive mobile atât pe bază de Android cât și cu iOS, iar ca bază de date spațiale s-a utilizat un model destinat cartografierii și administrației resurselor de sol. În analiza celor două aplicații s-au urmărit o serie de aspecte esențiale precum ergonomia aplicației, compatibilitatea cu cele două sisteme de operare a dispozitivelor mobile, modul în care înregistrează entitățile spațiale de tip punct, linie sau poligon, interacțiunea cu programul QGIS și cu particularitățile bazelor de date, etc. Ambele aplicații transferă proprietățile proiectului (sistemul de proiecție, tabelele de attribute, simbolurile elementelor spațiale, etc) din QGIS către echipamentele mobile prin intermediul unor plugin-uri specifice, care, după finalizarea procesului de colectare a datelor din teren, intervin și în sincronizarea acestora cu bazele de date existente. Înainte însă de utilizarea propriu-zisă a celor două aplicații mobile este necesar ca în prealabil să se desfășoare o serie de operații pregătitoare precum stabilirea formularelor pentru înregistrarea datelor tabelare, identificarea tipurilor de elemente înregistrate, utilizarea diferitelor tipuri de widget-uri, etc. După utilizarea celor două aplicații, prin comparație, se remarcă o serie de aspecte importante precum faptul că aplicația QFIELD este disponibilă doar pentru platforma Android în timp ce MerginMaps funcționează în ambele sisteme de operare. Un alt aspect este modalitatea de sincronizare a datelor care se realizează diferit de la o aplicație la alta, QFIELD utilizează Geopackage ca modalitate de înregistrare și stocare a datelor în timp ce MerginMaps utilizează Cloud-ul ceea ce permite utilizarea ambelor tipuri de baze de date (Postgres/PostGIS și Geopackage). Menționăm de asemenea că atât QFIELD cât și MerginMaps sunt încă în curs de dezvoltare astfel încât anumite funcționalități pot fi îmbunătățite în viitor sau pot fi adăugate funcții noi.

This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CNCS - UEFISCDI, project number PN-III-P4-PCE-2021-1350, within PNCDI III.

Intra-regional disparities in the distribution of development funds in Romania

Opria Ana-Maria, Roșu Lucian, Corodescu-Roșca Ema, Iațu Corneliu

Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

opriaanamaria@yahoo.com; lucian.rosu@uaic.ro
ciatu@uaic.ro

One of the 17 SDGs on the EU agenda to be achieved by 2030 is to reduce development inequalities. According to the European Commission, reducing inequalities will contribute to achieving the desired European social cohesion level and to sustainable poverty reduction. These inequalities exist both between regions belonging to the same country and between European countries. Various European funds as well as national funding sources contribute to achieving the goal of reducing inequalities by providing financial support for a variety of development projects. However, their success in reducing inequalities depends on how the funds are managed and how they are distributed between more developed and less developed regions. Studies show that more developed communities benefit more from this financial support than less developed ones, which favours widening the gaps. Taking this into consideration, the study aims to analyse the distribution of financial support to the Romanian territory, an area marked by strong disparities. The hypothesis underlying the study is that there is a negative discrimination in the way financial support is channelled at intra-regional level in Romania, leading to a deepening of pre-existing disparities. In order to test this hypothesis, some of the funds absorbed by Romanian communities so far have been taken into account (eg. Anghel Saligny funds, NRD). The tools used in the construction of the analysis are hotspot analysis – in order to identify spatially similar territories and grouping analysis - to identify the characteristics of disadvantaged territories. The results show spatial differences that lead to the validation of the above hypothesis in some cases. This underlines the lack of coherence between the political discourse and the concrete results obtained so far from the actions undertaken in Romania to reduce inequalities. Thus, although reducing existing regional imbalances, with a focus on stimulating balanced development and revitalising disadvantaged areas, is a priority, a basic objective of regional development policy in Romania, the spatial distribution of funds may lead to the opposite result.

Geoinformational support for development of the Danube-Prut and Black Sea river basin management plan

Bejan Iurie¹, Castravet Tudor², Dilan Vitalie², Căpățină Lucia², Jechiu Iradion¹

1. Institute of Ecology and Geography (Moldova State University), Chișinău, Republic of Moldova

2. Faculty of Geography, “ION CREANGĂ” State Pedagogical University of Chișinău, Republic of Moldova

dilan.vitalie@upsc.md; iurie.bejan@gmail.com
castravet.tudor@upsc.md; capatina.luci@upsc.md
radu_jechiu@yahoo.com

In this paper, the development of a GIS Atlas for elaboration of River Basin Management Plan for the Danube-Prut and the Black Sea hydrographic district is presented. Management Plan for the second cycle (2022-2027) was developed according to EU Water Framework Directive. River basin management plan incorporates in one document description of river basin, analysis of current state, monitoring results and activities plan for improving the quality and quantity of water resources at the transboundary level. To support the basin characterization process, pressure impact analysis and delineation of water bodies at risk and have a visual representation of the above-mentioned factors, a number of thematic maps have been prepared for the Project using QGIS Software.

Keywords: River Basin Management Plan, Web-based GIS Atlas, thematic maps, QGIS Software

Inconsistent series, statistical analysis and graphical representation in GIS. Good & Bad practices

Gabor Vicențiu, Groza Octavian, Rusu Alexandru

Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

gaborvicentiu@gmail.com; grozaoctavian@yahoo.fr
alexrusucuguat@yahoo.com

The uncertainty in geography (and in many other sciences) is one of the problems which clearly structured the cartographic debates in the last 20-30 years. One of the causes of cartographic uncertainty stems from inconsistent data series, a frequent source of inaccurate visual representations of statistical data. Our discussion begins with a specific case (the data series between 2011-2020 referring to the suicide phenomenon in Romania) and explores the ways in which inconsistent data series can be processed and represented through GIS tools to minimize the uncertainty included in the final maps. Framed within a wider field of thematic cartography focused on socio-economic variables, the discussion tests a series of methods for processing, discretizing, and representing information for the purpose of identifying good or poor practices of using the options offered by GIS. The research is based on the examination of several geostatistical analysis methods as a way to manage inconsistent data series and on the comparison of several methods capable of diminishing uncertainty and leading to coherent geo/cartographic representations. In addition, the research brings forward an examination of different cartographic techniques for representing statistical distributions and a comparison between advantages and disadvantages of using specialized programs such as PhilCarto and ArcGis Pro. PhilCarto and ArcGIS Pro are two software programs that can create graphical depictions, each having specific advantages and disadvantages relative to the user's needs and level of experience, and especially to his final targets. To achieve these targets, it is essential to choose the right software, and when using it, to select the most suitable cartographic representation method for the data series, especially if they exhibit the characteristics of statistical inconsistency. The achieved results show that the use of appropriate methods of statistical analysis and graphical representation can be very useful for working with inconsistent data series in GIS, but it is important to pay attention to good practices and avoid deficient ones, in order to obtain a correct and coherent representation of the data. These results can be useful for researchers, data analysts, and professionals working in the GIS field and beyond. With that being said, the researcher must be alert to less recommended practices in the analysis, processing, and representation of inconsistent data series (selective extraction of data to support a certain conclusion, elimination of exceptional data, incorrect or inaccurate use of statistical or cartographic techniques).

A GIS assessment of the Internet speed at LAU level in Europe - the ITC territorial endowment as a condition for smart-working deployment

Rusu Alexandru

Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași,
Romania

alexrusucuguat@yahoo.com

The relation between the diffusion of smart-working and the Internet infrastructures is debatable and for a better understanding of this association, the research needs to focus more on the local level, a scale where the territorial endowment might act as a barrier in the development of teleworking practices. In Europe, the experience of the COVID 19 closure period and the sudden shift from traditional activities to remote work already created the theoretical frame for a geographical investigation of the ITC endowment, usually at regional scale. Different policy studies (ESPON – T4, e.g.) and some scientific papers (Capello R. and Lenzi C., 2019; Edquist, H., 2022, e.g.) are already focusing on this direction of study. Our approach is based on the integration of large datasets of Internet speed measurements (provided by a specialized company - Ookla) in the local administrative geometry, using the 2021 information and vectors. The integration process allowed us to create local indicators of territorial performance (Internet speed and latency) and to compare them with the business and employees' structures, in a limited number of case studies – France, Spain, Italy, Poland and Romania. The main conclusion of the European analysis and the case studies points that the combination between ITC infrastructures and smart-working oriented local structures will reshape the map of the economic performance in the EU, raising new challenges for planning and policy design.

Mapping forest landscape change in Putna-Vrancea Natural Park, Romania, using diachronic cartography and GIS

Istrate George Adrian^{1,3}, Istrate Vasilica², Adrian Ursu¹, Iuliana Breabă¹, Ion Militaru³

1. Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

2. S.C. Intervenții Active în Atmosferă S.A., Bucharest, Romania

3. RNP Romsilva Administrația Parcului Natural Putna-Vrancea, România

istrate.adrian7777@gmail.com; istratevasile87@gmail.com

ursu_v_adrian@yahoo.com; iulianab2001@gmail.com

ion.militaru@gmail.com

Being one of the wildest mountain areas in Romania, Putna-Vrancea Natural Park encompasses within its boundaries species of international importance of flora and fauna. Although the forest occupies most of the park area, it has undergone some significant changes over the past two centuries. This paper aims to provide a temporal and spatial analysis of the modification of the forest landscape based on historical maps and orthophoto plans. Based on available cartographic materials from 1789, 1895, 1957, 1975, and 2018, periods of forest cover decrease or increase were determined. The analysis of forest distribution based on different natural factors (elevation, slope, soil type, and lithology) highlighted the beginning of the 20th century when forest cover decreased at low elevations and slopes. The evolution of forested areas on different soil types and lithology indicates the most significant changes in black and alluvial soils and substrates represented by clay, breccias, and salt. Almost all changes were, however, due to anthropogenic factors. A specific socio-economic system of the mountainous region of Vrancea, whereby the forest was and still is in the common possession of the inhabitants of some villages, led to periods of deforestation: through burning for the expansion of pastures; through unsustainable exploitation of wood by some companies that leased this right from the community. A period of reforestation in the 1960s and 1970s and a transformation of mountain meadows into forests in the last two decades are also noteworthy. Thus, although there are some limitations in using old maps for such analyses, the results obtained decipher the causes of the transformation of forest landscapes in some areas of PVNP.

Interactive Visualisation of Spatial Patterns of Students Enrolled at Faculty of Geography and Geology, UAIC

Dinter Oliver-Valentin, Roșu Lucian

Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

oliverdinter7@gmail.com; luci_r2003@yahoo.com

Data visualisation techniques are becoming more and more present on different online channels nowadays. As millions of people with different social background access online resources daily, it is important that the manner of representing data or results of data analysis is easy to read and understand. In geography, maps and charts are essential in order to provide a better insight of different processes and phenomena as well as their causes and effects. The graphic representations have a much higher impact than endless tables, making the data more accessible to different categories of public. A tendency of switching from classic to interactive maps could be observed in the last years, producing more user-friendly information and offering the possibility of exploring more features than the ones visible on the map. While large stacks of data rest on paper or in tabular forms, it becomes hard to predict or to develop strategies without a proper analysis. In Higher Education, it is essential to understand the background of students in order to take further action in promoting and managing academic activity. The present study uses ArcGIS Online platform as an environment for interactive representation and visualization of the origin of the students enrolled in the last 5 years at the Faculty of Geography and Geology, Alexandru Ioan Cuza University of Iași. ArcGIS Map Viewer is used to create the map which will reveal the catchment area of these students, providing details concerning the year of enrolment, programme of study, age, citizenship, gender, graduated high school, high school profile etc. without revealing the identity of any student. This data will serve as the ground in unveiling the spatial patterns of students that have chosen to follow the courses of this institution, in order to observe how these have changed over a 5-year span. Moreover, it will be possible to gain an insight of the high schools that have generated most students from 2018 to 2022. Pop-up tabs will be generated for each point representing students, revealing all the above-mentioned details. The obtained maps will then be transferred to ArcGIS Dashboard, which provides the tools in order to configure an interactive application. This will allow the users to apply the desired filters by selecting the students either by county, settlement, gender, high school, citizenship, programme of study or year of enrolment, which could be combined in a highly personalized way, unveiling uncountable possibilities of spatial patterns, doubled by insightful charts. As a result, this application will be useful not only in visualizing the data in an interactive way, but it will be helpful for the institutional staff in developing strategies for attracting new students in the fields of geography and geology.

GIS - based evaluation of aquifer vulnerability to pollution

Alion George-Ştefan, Breabă Iuliana-Gabriela

Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași,
Romania

aliongeorgestefan@gmail.com; iulianab2001@gmail.com

Water quality management from underground sources has become, in the last decades, one of the main challenges faced by human society, being crucial in the context of ensuring the daily consumption demands of the population. The attempt to preserve a good water quality obtained from aquifers and the urge to rehabilitate groundwater bodies affected by pollution has generated the need for sustainable management to be established. In order to achieve this purpose, several sets of regulations and measures were implemented, aimed at managing these resources. The pressure to which the aquifers are exposed and the challenge to prevent the qualitative alteration of groundwater has conducted to the development of predicting models for the vulnerability of natural and anthropogenic environments to pollution with compounds derived from the fields of activity of human society, the DRASTIC model being one of them. At the Botoșani county level, the main geological and hydrological factors that potentially impact aquifer pollution were taken into account. Several raster datasets were generated such as depth to water table (D), aquifer recharge (R), aquifer type (A), soil texture (S), topography (T), vadose zone's impact (I) and hydraulic conductivity (C). For each factor were assigned grades between one and ten according to the overall importance, so the vulnerability map was generated by combining the seven individual layers. The DRASTIC index obtained varies between 89 and 175, indicating that the relative vulnerability of the aquifers varies between medium and very high. The high vulnerability class has a uniform distribution, while, the very high vulnerability class presents a layout mostly in the western and northeastern parts of the county. The medium vulnerability class can be found in the southeastern part of the study area, covering a region where the depth up to the water table and also the soil texture, does not favour good water descending on the soil profile.

Cultural heritage in Moldova, Romania and its vulnerability to flash floods: a case study of Jijia Valley

Iosub Marina, Chelariu Oana-Elena, Enea Andrei, Lesenciu Dan, Minea Ionuț

Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

iosub.marina@gmail.com; oana.chelariu@uaic.ro
andr.enea@gmail.com; dlesenci@yahoo.com
ionutminea1979@yahoo.com

Climate change is causing increasingly dangerous extreme events globally, with floods having the potential to cause irreversible damage or complete destruction of cultural heritage sites. In Europe, floods are impacting a significant number of cultural heritage sites and buildings each year, prompting the creation of a Directive by the European Council to manage flood risk. Romania has experienced devastating floods in the mid to late 2000s, causing billions of euros in material damage, particularly in the Moldova region, which is of historical importance due to the large number of Cucuteni sites, a Neolithic archaeological culture dating from 5500 B.C. to 2750 B.C. Several other heritage sites, including Precucuteni and Horodișteea-Erbiceni/Godinești, are also located in the nearby vicinity of the river floodplain and are considered highly vulnerable. This study utilizes hydrological flood risk maps to assess the risk to cultural and historical heritage sites in the Jijia River Valley, which extends 180 kilometers, with its main course flowing parallel to the Prut River for almost 45 kilometers along its floodplain. The floodplain is wide, ranging from 0.5 to almost 3 kilometers, and is located exclusively within Botoșani and Iași county, partially or completely including 125 communes.

Some aspects of the floristic diversity of the Bălți urban ecosystem

Certan Corina, Portarescu Anastasiia, Grabco Nadejda, Bulimaga Constantin

Institute of Ecology and Geography (Moldova State University), Chișinău, Republic of Moldova

certancorina@gmail.com; portarescu.anastasiia@gmail.com

nadejdagrabco@gmail.com; cbulimaga@yahoo.com

Urbanization influences the structure and composition of the vegetation of a region, reduces the number of species, species with a narrow ecological range disappear, non-native species show their invasive character, etc. As a result of the changes, new forms of isolated species appear, their specific features are established. According to the author Boboc N., the Balti urban ecosystem, from a physical-geographical point of view is located in the Steppe Plain of the Lower Cubolte, which is part of the Bălți Steppe district, being located at the border to the physical-geographic subregion of the Steppe Hills of Ciulucurilor (B2), and from the geomorphological point of view, the study area is characterized by a weak hilly relief of a large amphitheater with strongly raised sides, formed by the bed of the Răut river. The vegetal biological diversity of the Balti urban ecosystem demonstrated that the flora of this ecosystem is obviously different from the typical spontaneous zonal flora of the steppes. Field research during the vegetation period of 2020-2022 were carried out based on the floristic study of 13 resorts established in the Balti city. The assessment of the floristic diversity was realized out by the method of linear transects. In order to assess the productive potential of herbaceous plants within the Balti urboecosystem, phytocenological eradication were carried out from 8 sites, using the quadrat method. The determination of superior plant species was carried out according to specialized works. The floristic spectrum, in the resorts of Balti, is represented by 149 species, grouped into 114 genera from 37 families of magnoliophytes. The most representative in the Balti urban ecosystem are the Asteraceae and Poaceae families, with 35 and 22 species respectively. In most of the researched stations, the degree of coverage is 95–100%. The analysis of the biological indices of the species in the researched sites revealed: ruderal species 47%, spontaneous species 39% and segetal-ruderal 14%. The maximum percentage belongs to ruderal and segetal-ruderal species, which demonstrates a high degree of anthropization of the Balti urban ecosystem. An indicator that provides information about the state and capacity of the ecosystem is net green phytomass. The amount of phytomass contributes to the productivity and sustainability of the ecosystem, being also dependent on a series of conditions: climatic, ecological, pedological, geographical, but also depend on the anthropic factor. The results show us that in the sites, where the intense activity of the anthropic factor persists, the reduced productivity of the grassy layer is attested. The floristic study indicates that the flora of this ecosystem was formed by the way of the permeated of spontaneous autochthonous species, which adapted to the conditions of the urboecosystem, and of allochthonous species, which penetrated the territory of the Republic of Moldova in different ways.

Using consumer devices for enhancing the tourism experience. An application of AR and VR for increasing awareness of the Lost Cultural Heritage -namely Princely Court from Iasi, Moldavia

Roșu Lucian, Foșalău Manuel

Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

manufosalau99@gmail.com; luci_r2003@yahoo.com

The development of technologies in the last 30 years has allowed the implementation of new ways of interaction between people and the technological space. And this progress has a significant contribution in all fields, including the valorisation of cultural heritage. A new dimension offered by VR and AR technologies is the recreation of urban scenes or cultural buildings/sites that no longer exist in the current real space. Thus, a series of urban scenes, disappeared historical buildings or architectural landscapes lost to time or interiors were virtually recreated and brought back to life with the help of these technologies. The present research proposes the use of an interdisciplinary model to increase the tourist experience and awareness of the lost historical heritage through the use of consumer devices. The present research uses the use of maps, plans, paintings, photographs and 2D images, 3D reconstructions and the digital narrative format for the three-dimensional digital reconstruction of the different stages of the Princely Court of Iași. The results of historical recovery and recreation obtained bring several elements of novelty, among which we can mention: a. observing the spatial changes in the location of the elements built in the perimeter of the Princely Court from Iași; b. observation in three-dimensional format of the differences in the initial form of some constructions (the Church of St. Nicolae Domnesc) and the reconstructed forms (the current Palace of Culture). Strengthening the idea of continuity of the Princely Court from Iași by comparing the shapes and the footprint on the ground of the same foundation of the construction on which the Palace of Culture is based today. The component of increasing the tourist experience was used in the space arranged in the premises of the Palace of Culture - where the results obtained were exhibited in 5 working spaces - the 5 stages being symmetrically placed and highlighting the urban scenes of the same space in different periods. Thus, the user could see both the geography of the area in different periods as well as the changes in form and content of the Royal Court from Iași. With the help of the drone and photogrammetry technologies, the current Palace of Culture was recreated three-dimensionally, and with the help of a 360 camera located inside the hall, the exhibition was scanned and recreated virtually. The software used for photogrammetry and scanning (Agisoft, MatterPort) allowed linking the real elements into the virtual space making the virtual visit possible. The use of creative industry technologies and the use of three-dimensional digitization techniques can make significant contributions both to better historical knowledge and to increasing the tourist experience in a destination. Moreover, they can facilitate the integration of the results in online environments or in any other place - leading to better knowledge and tourism promotion of the cultural heritage. The outcomes are expected to open new possibilities for museum visitor's navigation, content visualization, and playful and educational effective interaction with museum artefacts.

A visual GIS tool for assessing Smart City indicators in Romania

Bejenaru Ioana, Roșu Lucian, Dinter Oliver-Valentin, Iațu Corneliu

Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași,
Romania

bejenaruioana98@gmail.com; luci_r2003@yahoo.com
oliverdinter7@gmail.com; corneliu.iatu@gmail.com

The smart city concept has become indispensable over time for urban areas to develop and create an environment that generates a high level of quality of life. It makes a major contribution to the action of forming resilient communities to possible conflicts that can disrupt the smooth running of things. Although no generally valid structure concretely establishes what a smart city means, several particular aspects of the concept have been identified, along with six dimensions that capture the aspects necessary for a city to be called smart: smart economy, smart people, smart governance, smart mobility, smart environment, smart living. A smart initiative can simultaneously fulfill the directions of several dimensions; thus, an initiative often facilitates several needs, from several fields. Organizations or institutions generally make the different classifications to evaluate the degree of development and, at the same time to observe the strengths, but also the weaknesses of the different areas of development: urban development, sustainability, infrastructure, resilience etc. These classifications are relying on different ranking methods and criteria to obtain relevant results. These can influence certain decisions related to the implementation of projects or the attraction of possible investors. However, they can also be the result of marketing strategies initiated even by local administrations. The concept is most often interpreted and approached differently in the public environment compared to the academic one, and leads to its wrong implementation, which does not simultaneously meet the conditions of social involvement, resilience, and sustainability combined with digital elements. In general, the rankings are based on data containing the number of initiatives for each city and which category they belong to. The purpose of our study is to present smart city data in a new way, using other types of indicators compared to the usual ones, so that an overall picture is outlined that includes several localities and not just the big cities of Romania, which are often the only ones that stand out. We analyzed the available data from Citadini.ro website, which involves 65 indicators that are divided into two categories, subjective and objective indicators. They capture a different reality due to the attempt to eliminate the demographic dimension and to focus strictly on the elements that outline the smart city concept. With the help of GIS services, an interactive visualization of the dimensions of the smart city concept will be attempted based on the obtained indicators. **Keywords:** smart city, geographical information system, indices, development.

The usability of COPDEM in geomorphologic studies

Nicușor Mihai

Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași,
Romania

niculita@uaic.ro

COPDEM is the “new SRTM” in the sense that it is the newest DEM that has global coverage. The 90 m and 30 m resolution (along latitude) versions (called GLO-90 and GLO-30) are now freely available. With the availability of the 30 m, the 90 m is superfluous. Another dataset with restricted access is the EEA-10, available only for Europe and specific users of EU-funded projects and EU institutions. This dataset is actually the source for the other two and is close to the original TanDEM-X/WorldDEM. The Copernicus DEM is based on the WorldDEM data which is based on TanDEM-X Mission and TerraSAR-X Synthetic Aperture Radar (SAR) interferometry. The two satellites TerraSAR-X and TanDEM-X operated as a single-pass SAR interferometer (InSAR), using the bi-static InSAR StripMap mode. At least two complete data coverages of the Earth’s surface were acquired and used to generate the DEM product. The data acquisition started in December 2010 and was completed by January 2015. We use LiDAR data resampled to 10 and 30 m to assess how good the COPDEM DEMs represent the earth surface in terms of feature resolution. The COPDEM is actually a DTM, having many terrain features beside earth’s surface: vegetation, buildings, roads, bridges, and water, while river and lakes were edited. The results show that in areas where there is no vegetation or man-made features the feature resolution of the COPDEM is quite good. Channels, levees, landslide and even big gullies are shown. The EEA-10 m DEM requires some filtering because there is a short-range noise present. An edge preserving filter is needed to keep the landform features.

Building extraction and reconstruction from very high resolution Pleiades imagery

Breabă Ana-Ioana¹, Oniga Ersilia²

1. Technical University of Civil Engineering of Bucharest, Romania

2. Technical University Gheorghe Asachi Iasi, Romania

anaioana2004@yahoo.co.uk; ersylya83@yahoo.com

The stereo image acquisition capability of spaceborne platforms facilitates the generation of Digital Surface Models (DSMs), which provides great knowledge for assessing the aboveground objects. Thus, the satellite images are relevant for information extraction about the Earth surface. For the urban environment, building information extraction and reconstruction represents an imperative challenge that should be addressed since facilitates the development of further remote sensing applications. The study aims to improve the accuracy of 3D building models created based on stereo Pléiades satellite imagery, having as the main step the use of an accurate DTM in the dense image matching process of stereo Pléiades satellite imagery. In addition, the impact of the DTM on the dense image matching process for deriving DSM and DTM point clouds, together with the use of Pléiades-DSM point clouds for automatic creation of the LOD1 building 3D models in a GIS environment, is analyzed. For 3D building reconstruction, a prismatic model at LOD1 was chosen starting from existing buildings sub-footprints. In this regard, for the point cloud generation, two scenarios were considered: (1) no DTM and ground control points (GCPs) with uncorrected ellipsoidal heights resulting in an RMS difference (Z) for the 64 GCPs and 78 check points (ChPs) of 69.8 cm and (2) with low resolution ALS-DTM and GCPs with corrected ellipsoidal height values resulting in an RMS difference (Z) of 60.9 cm. Considering the DTM and the DSM as the main dataset input for 3D building reconstruction, high importance should be given to the dense image matching process. By introducing previously available surface elevation information in the image matching process as a prediction parameter improves the robustness of the entire process, considerably reducing the systematic effects.

Active landslide mapping based on full-resolution EGMS products

Necula Nicușor¹, Nicușă Mihai²

1. RECENT AIR - Geography and Earth Physics Laboratory, Tulnici Research Station , Faculty of Geography and Geology, "Alexandru Ioan Cuza" University of Iași, Romania

2. Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

nicusor.necula@uaic.ro; mihai.niculita@uaic.ro

Landslide deformations have become a significant threat in the nowadays context of climate change and global urbanization. Fortunately, depending on their typology, some landslides can be identified and mapped in a first stance, and further monitoring and mitigating policies can be implemented. In our case, we focus on the slow-moving landslides with typical velocities of 16 mm/year, specific to our study area. To identify the active landslides, we exploit the European Ground Motion Service products, which consist of temporal measurements based on the Sentinel-1 SAR images and processed with Multi-temporal Differential SAR Interferometry techniques. The EGMS program provides consistent and reliable InSAR measurements of ground deformations over the Copernicus Participating States. The products consist of measurements with millimeter accuracy, which can be accessed and downloaded from the platform. The measurements include GNSS-calibrated full-resolution velocity and displacement time series for the ascending and descending orbits and calculated displacement vectors in the vertical and E-W directions, resampled to a 100 x 100 m grid. Hence, exploiting the full-resolution data of the ascending and descending orbit, we successfully identified areas with active displacements produced by landslides. Besides the raw displacements, we also calculated the velocities of the horizontal and vertical components and projected the velocities along the maximum slope. These measurements are more suitable for the spatial assessment of the landslide and to validate the deformation mechanism.

The use of spectral techniques to monitor the vegetation status in a protected area in the Iași county

**Bobric, Elena Diana^{1,2}, Stoleriu, Alexandra Petronela^{1,2}, Niacșu, Lilian¹,
Breabă, Iuliana Gabriela^{1,2}**

1. Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

2. Institute of Interdisciplinary Research - ICI-UAIC, CERNESIM Department

dianabobric@yahoo.com; stoleriualexandra@yahoo.com

lilianniacsu@yahoo.com; iulianab2001@gmail.com

Remote sensing technology offers the ability to monitor biophysical attributes and changes in plant biomass and productivity during the growing season, which may allow for sustainable management. Recent advances in satellite remote sensing technology produced innovative sensors to monitor the Earth's surface with an increasing spatial and temporal resolution of available satellite images such as those provided by Sentinel-2, creating new opportunities for environmental monitoring and generating accurate datasets. This study aimed to evaluate the vegetation state during the spring, summer, and autumn seasons in a protected area around Iasi city, called "Dealul lui Dumnezeu" using biophysical indices derived from Sentinel-2 satellite images. The study area was chosen through the lens of the alarming information received by the Iasi County Council, on the change in the state of vegetation within the site of community importance, as well as the development of anthropogenic activities with a major impact on the analyzed perimeter. The analysis was based on the following indices: normalized difference vegetation index (NDVI), leaf area index (LAI), canopy chlorophyll content (CCC), canopy water content (CWC), the fraction of absorbed photosynthetically active radiation (FAPAR), and fraction canopy cover (FCOVER) derived spectrally, from Sentinel-2 high-resolution images. Sentinel-2 satellite images acquired in March, April, June, July, September and October (three seasons, 2020 to 2022) were utilized in the process and analysis. The Sentinel 2 satellite images were preprocessed using the open-source SNAP program, in which from TOA images were obtained BOA images, after which the ArcGIS program was used to create the final maps, but also to extract information at the pixel level. The results indicate that the highest values for NDVI, LAI, FAPAR, FCOVER, CAB, and CW occurred during different periods of the year, as follows: for the spring season, the highest value was on 10 April 2020; for the summer season, the highest value was on 09 July 2021; and for the autumn season, the highest values were on 07 September 2021. The analysis also included land-use type, with non-irrigated arable land having the highest values for the various indices. The results highlight the potential of Sentinel-2 images for these types of analyses, in which it can be used to observe the vegetative state.

Acknowledgement: This work was co-funded by the European Social Fund, through Operational Programme Human Capital 2014-2020, project number POCU/993/6/13/153322, project title << Educational and training support for PhD students and young researchers in preparation for insertion into the labour market.

Assessing spatial inequalities in Iași Metropolitan Area

Foșalău Cristian-Manuel, Roșu Lucian

Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași,
Romania

manufosalau99@gmail.com; luci_r2003@yahoo.com

Urban structures, as well as the ones that are under the direct influence of a city, can be classified by population, surface area, economic activities, dynamics and mobility. In literature and in official planning and organisation documents, various names are used: metropolitan area, functional urban area, growth pole and so on, having different definitions depending on the country or region. Polycentric development of urban settlements is one of the most pursued modern strategies in order to obtain an even economic growth at a local and metropolitan scale. In this way, several measures can be taken in order for the goals of the metropolitan area as an institution to be achieved. Among the advantages of polycentrism, we mention a more efficient land use, reduced pollution, less traffic, developing the cohesion among the territorial administrative units and strengthening the relationships among them. All of these lead to a sustainable metropolitan development, a key concept widely discussed in territorial planning. In the context of the existence of a metropolitan area as an official administrative entity to assure a coherence among its members and the context of a fast growth of the periurban area, this paper aims to evaluate the actual situation regarding the gaps, territorial inequalities and the degree of integration in Iași Metropolitan Area (IMA). Using GIS and spatial analysis methods, we are looking for the answer to several questions, such as: "To what extent are the communes inside IMA chosen by the proximity or by the economic development criterion?", "What are the dimensions and activities within IMA that lead to an even development?" and "How could a GIS-planned development lead to breaking the inequalities and help a polycentric and sustainable development happen?"

Developing an INSPIRE compliant SDI for the Romanian meteorological data

Crăciunescu Vasile¹, Iosub Florin², Urdă Daniel²

1. Romanian National Meteorological Administration, Romania

2. Essensys Software, Romania

vasile.craciunescu@meteoromania.ro; florin.iosub@essensys.ro
daniel.urda@essensys.ro

Through the INSPIRE directive, the European Commission aims to standardize the data sets produced by EU member states in order to ensure better cross-border cooperation for economic and scientific purposes. In the case of data produced by the Romanian National Meteorological Administration (Meteo Romania), this presents certain difficulties, given the volume of data (230 meteorological stations with multiple parameters having data starting from 1960), the continuous process of collecting them (most updated every 6 hours), as well as the lack of reference implementation models at the start of the project. In order to implement the INSPIRE Directive for Meteo Romania, the implementation team used a suite of open-source technologies and applications (PostGIS, HALE Studio, GeoServer, GeoNetwork, MapStore, GeoHealthCheck, etc.) to store and distribute this data, taking into account both general standards (OGC, INSPIRE) and those specific to the meteorological domain (GRIB, BUFR). Through the project, a series of standard services were implemented: Discovery (CSW), Visualization (WMS), and Download (WFS), with corresponding metadata in accordance with specifications and best practice guidelines, as well as a set of auxiliary tools (map client, validation and monitoring services).

SIA "Cadastrul de Stat al Apelor" - instrument pentru managementul integrat al resurselor de apă în Republica Moldova

Bejenaru Gherman, Dilan Vitalie, Neghină, Mihaela

1. Serviciul Hidrometeorologic de Stat, Republica Moldova
2. Faculty of Geography, "ION CREANGĂ" State Pedagogical University of Chișinău, Republic of Moldova
3. Agenția "Apele Moldovei", Republica Moldova
gherman.bejenaru@meteo.gov.md; dilan.vitalie@upsc.md
mihaela.neghină@apele.gov.md

Lucrarea prezintă procesul de dezvoltare a Sistemului Informațional Automatizat "Cadastrul de Stat al Apelor" – de la proiectare până la punerea în producție a acestuia, pentru asigurarea unui management integrat al resurselor de apă din Republica Moldova. SIA „CSA” este un instrument eficient și necesar deoarece pe de o parte reprezintă sursa oficială de date despre resursele de apă de pe teritoriul Republicii Moldova, pe de altă parte – este acel spațiu informațional unitar disponibil tuturor utilizatorilor interesați. Multitudinea datelor în domeniul resurselor de apă a determinat factorii de decizie de a crea un sistem fezabil pentru colectarea, prelucrarea, transmiterea și păstrarea informației, pentru realizarea evidenței datelor despre resursele de apă și oportunitatea asigurării persoanelor cointeresate cu date privind starea și protecția lor pe întreg teritoriul Republicii Moldova. SIA „CSA” reprezintă o soluție care răspunde la aceste solicitări, iar prin abordarea sistemică conceptuală contribuie direct la modernizarea serviciilor publice prin digitalizare și la eficientizarea elaborării și implementării politicilor de dezvoltare și de supraveghere a sectorului de protecție a resurselor de apă.

Remote sensing applications for mobile devices: between observing the Earth and processing satellite data on the fly and the race between humans' needs and technology offerings (1st note)

Roman Aurelian-Nicolae

Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași,
Romania

nickroman@gmail.com

Remote sensing is the acquisition of information about the earth's surface from a distance, without physical contact. This technology has been used for decades by researchers and faculty students in various fields, including geology, environmental studies, agriculture, and urban planning, to gather data and analyze changes in the environment over time. With the advent of mobile devices like smartphones, remote sensing applications have become more accessible and affordable, allowing for real-time data collection and analysis. Android-based smartphones offer several advantages over traditional remote sensing technologies, including high-resolution cameras, GPS capabilities, and powerful computing capabilities. This makes them an excellent tool for researchers and faculty students who need to collect and analyze data quickly and efficiently. For example, a geologist can use a smartphone to capture high-resolution images of rock formations or geological features, which can then be analyzed using software to identify patterns and trends. Another important application of remote sensing on mobile devices is in the field of environmental studies. With the help of specialized apps, researchers can use their smartphones to track changes in temperature, air quality, and other environmental factors in real-time. This data can be used to study the impact of human activities on the environment, and to identify areas that are most vulnerable to climate change. Agriculture is another field where remote sensing on mobile devices can be useful. Farmers can use their smartphones to take pictures of their crops, which can then be analyzed using specialized software to identify pests, diseases, or other issues that may affect crop yields. This can help farmers take proactive measures to prevent crop damage and improve their yields. Urban planners and architects can also benefit from remote sensing applications on mobile devices. By using their smartphones to capture images of buildings and other structures, they can analyze the impact of urban development on the environment, and identify areas where improvements can be made to reduce the impact of human activities on the natural environment. In conclusion, remote sensing applications for mobile devices like smartphones operating on Android offer a range of benefits for researchers and faculty students. By providing real-time data collection and analysis capabilities, these tools can help researchers and students in various fields to gather data quickly and efficiently, and to analyze changes in the environment over time. This can lead to more accurate and effective research findings, and ultimately, better solutions for addressing the environmental challenges facing our planet. The true questions are how far can we go with data acquisition using mobile hand-held devices and which part and how much processing will we be able to do while being offline? And why.

The use of GIS technology in cultural heritage studies

Spiridon-Ursu Petronela, Ursu, Adrian, Breabă Iuliana-Gabriela

Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași,
Romania

spiridon.petronela@gmail.com, ursu_v_adrian@yahoo.com
iulianab2001@gmail.com

Experts from cultural heritage activities are using more and more often GIS technologies to evaluate the local heritage. This paper aims to present the current conservation status of some old ecclesiastical buildings in the Moldavian Plain, using GIS technologies for a better understanding and valorization of the cultural heritage in an integrated manner. First, we created a spatial database of ecclesiastical heritage included in the most recent national list of cultural heritage, in 2015. Then we attached specific attributes such as the year or period of construction, the year of the last interventions/restorations/reconstructions over time, etc. to each vector object. In this way, it was possible to generate a number of maps that emphasize the old ecclesiastic distribution in the study area and a close look at the city center etc. This attributes database can be updated in real-time, and in this way, the governmental institutions can decide their conservation policies in a more accurate way, compared with the traditional methods.

UAV LiDAR data testing and evaluation in densely forested areas

Necula Nicușor¹, Toma-Dănilă Dragoș², Năstase, Eduard Ilie², Tătaru Dragoș², Niculita Mihai³

1. RECENT AIR - Geography and Earth Physics Laboratory, Tulnici Research Station , Faculty of Geography and Geology, "Alexandru Ioan Cuza" University of Iași, Romania

2. National Institute for Earth Physics, Romania

3. Faculty of Geography and Geology, Department of Geography, "Alexandru Ioan Cuza" University of Iași, Romania

nicusor.necula@uaic.ro; toma@infp.ro
eduard_nastase@infp.ro; dragos@infp.ro
mihai.niculita@uaic.ro

Light Detection and Ranging (LiDAR) is recognized to be one of the most accurate and effective techniques that can provide highly accurate terrain models, whether we refer to the local, regional, or national scale. Usually, the system is mounted on an aerial platform, which flights at a specified height and plan, depending on the desired specifications. Unmanned Aerial Vehicles (UAVs)-based have demonstrated great potential for surveying and monitoring small areas, making them a great asset for local scale investigations when coupled with a mounted LiDAR system. We carried out four surveys in the Vrâncioaia and Năruja, Vrancea region, for which we used a system consisting of an Acecore Noa UAV hexacopter and a YellowScan Vx20-300 LiDAR. The number of shots per second was 100k over 1200 (300kHz), and the operating flight altitude was between 70 and 100 meters, depending on the local terrain morphology - sometimes variable within the same flight. The hover speed was seven m/s with an overlap between tracks of 70%. In some cases, the flight plan consisted, besides the parallel lines, also of perpendicular lines at 900. A 30-minute flight sequence covered the testing areas with paths between 0.2 and 0.5 m. In our paper, we present and discuss the results and the analysis of various setups on data characteristics and generation of digital surface and terrain models. For processing, mainly YellowScan CloudStation was used. In one case study area with a landslide, a scan taken simultaneously with a Leica MS60 station was also performed, and merged cloud point data was created, showing how different technologies can contribute to a refined model. Preliminary results highlight the system's capability, obtaining a point cloud with great reflection intensity, a typical point density of up 2500 points/m², which can go to 10000 points/m², and five returns of the reflected pulse.