A BUSINESS PROJECT APPROACH TO ASSESS SPATIAL DATA INFRASTRUCTURES

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ABSTRACT

To promote the widespread use of geographic information systems and maximise access to geographic information, the concept of a spatial data infrastructure (SDI) has been popularised from the early 1990s onward. As a result of taking up the SDI initiatives there is a demand for outcome evaluation. The attempt to structure and organise the SDI evaluation is the multi-view SDI assessment framework, which acknowledges the multidimensional nature of SDIs and covers main purposes of assessing SDIs i.e. accountability, knowledge and development.

This paper presents the concept of a business project approach and its evaluation as the proposition for the multi-view assessment framework. This approach concentrates on the organization's business goals, risk, but also costs and benefits of information technology, spatial data products and the organization changes. The objectives of this study is to develop an approach of assessing an SDI that focuses on a business project characteristics and describe a meta model of the effectiveness evaluation. The business project approach extends viewpoints of assessing SDIs and is appropriate for both ex-ante and ex-post evaluation.

Keywords: spatial data infrastructure (SDI), multi-view framework, business project, assessment approach

A MAP OF HISTORIC NAMES AS A FORM OF CULTURAL HERITAGE PROTECTION

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ABSTRACT

In the paper, the methodology of mapping of historic names which was created under the project: "Restoring the historic Polish names using the maps (i.e. Waleckie Lake District)" funded by the Polish Ministry of Science and Higher Education and undertaken by the Institute of Geodesy and Cartography (Warsaw, Poland) together with the Adam Mickiewicz University in Poznan (Poznan, Poland) will be presented. This project is to be completed in mid-2015. The aim of this project is to find and to present, using the maps, the old Polish names of places and uninhabited objects, including physiographic objects from the area of Waleckie Lake District. The method of collecting names in the field, creating lists, digitizing and creating database of objects will be described.

Keywords: map, cultural heritage, historic names

AIRBORNE LASER SCANNING AND GIS APPLICATION IN PROTECTION OF CULTURAL LANDSCAPE OF FORTIFICATIONS

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ABSTRACT

Rational planning of cultural landscape is one of the main challenges for the urbanization process within a military landscape of fortified areas. Local authorities governing spatial planning need reliable studies and techniques to evaluate the planned changes in the landscape. The indispensable information might be obtained from GIS and spatial analysis based on integration of different data sources. When dealing with landscape of modern fortification one might rely on Digital Terrain Model (DTM) and Digital Surface Model (DSM), for which one of the best sources is Airborne Laser Scanning (ALS).

The paper presents results of experimental studies using an ALS datasets (from a country-wide project) for three different fortification complexes in Poland. The ALS datasets analyses resulted in the detailed and reliable models which can be of use for the evaluation of prospective urban changes.

The presented approach takes into account the quality of the ALS dataset in order to provide reliable results of spatial analyses. Subsequently, we generated and integrated ALS derived DTM and DSM with other data sources such as historical plans and CAD designs. Finally, the results from an integrated approach of spatial analyses were visualized.

Keywords: spatial analysis, GIS, aerial laser scanning,

APPLICATION OF GIS AND AHP FOR LANDFILL SITE SELECTION

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ABSTRACT

Determining the appropriate locations for landfills is one of the most critical problems. The complexity of resolving this issue comes from the large number of factors that should be taken into consideration when determining a location. Overall, the inclusion of larger number of valid factors enables selection of a more appropriate location. Geographic information systems in combination with the analytical hierarchy process representes an effective approach towards determining the suitability of locating landfills. The objective of the paper is based on the geographical information systems and ahp to determine the most appropriate location for locating a landfill. Therefore, as a case study Gevgelija-Valandovo Basin has been choose which is located in the southeastern part of the Republic of Macedonia. Based on the national and international criteria for locating landfills, 15 factors were allocated for which were determined appropriate weights. With the overlapping of GIS models we obtained the final model of suitability. The performed analysis showed that from a total of 1077 km^2, as the most suitable were selected 0.98 km^2.

Keywords: GIS, ahp, suitability, site selection, landfill.

APPLICATION OF THE NATIONAL DATABASE OF TOPOGRAPHIC OBJECTS IN MONITORING CHANGES OF URBAN INDICATORS IN SELECTED POLISH CITIES

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ABSTRACT

Virtually no urban standards regarding housing development currently exist in Poland. The last urban standard dates back to 1974, and is no longer valid. Housing development designed 50-80 years ago followed the rules of social housing. Isochrones were applied to determine pedestrian routes to nurseries and primary schools. Urban factors were also considered, such as: intensity of building development, green area per resident, density of population etc.

No guidelines have been recently imposed on the design of housing development that would force investors to plan nurseries or primary schools in housing areas for 10-20 thousand inhabitants. It is important to keep the minimum setback distance, the minimum of biologically-active area, and to provide possibly high intensity of building development.

This article compares urban indicators for modern housing, pre-war buildings, and recently designed buildings. This permits the comparison of the quality of life of the buildings' inhabitants, and an attempt to determine the most important urban factors for the residential environment.

Keywords: database of topographic objects, urban indicators, intensity of building development, housing development

APPLICATION OF WIRELESS SENSOR NETWORK FOR TEMPERATURE AND AIR HUMIDITY MONITORING IN THE BOTANIC GARDEN

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ABSTRACT

Wireless sensor networks are nowadays used both in environmental and socioeconomic fields. Environmental monitoring includes observing of basic meteorological variables, air pollutants, volcanic activity, landslides, etc. The major purpose of wireless nodes equipped with sensors is to collect data about selected environmental variables and send them to a gateway which is a gathering point of the whole wireless sensor network Temperature and air humidity values are measured at the predefined height, orientation and recording interval. These data show weather characteristics of the area of interest in days when the measurements were realized. The changes of temperature and air humidity values can be recorded in a small area in case that the measurement units are there distributed with high density. The knowledge of temperature and humidity characteristics of places situated in the area of interest can help to discover the most suitable places for different activities that are carried out in this area.

This study is aimed at the research of air temperature and relative humidity characteristics of the Botanic Garden in the centre of Olomouc City, Czech Republic. Temperature and humidity values were measured with sensors which were connected to wireless nodes, Waspmote Plug&Sense, produced by Libelium. Data from four nodes with sensors were used for the investigation of temperature characteristics. Data from one sensor recorded relative humidity characteristics. Temperature and humidity values from different positions within the Botanic Garden were graphically compared and visualized. Graph and map visualization showed the differences in measured values of selected variables in the Botanic Garden.

Keywords: Wireless Sensor Network, Temperature Monitoring,

APPLIED GEOINFORMATION SYSTEM OF SPACE MONITORING OF AGRICULTURAL RESOURCES

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ABSTRACT

The applied **system of space monitoring of agricultural resources** has been developed to the benefit of manufacturers of agricultural products and bodies of state administration in the field of agricultural production.

The space monitoring system implements the full technological cycle of processing of data of remote Earth sensing from space, generates the applied agrarian services and grants access to information to the end user through the multipurpose web interface (Geoportal). From user's point of view the system is intuitively simple mean of visualization of the applied agrarian services and attributive information connected with them. The proposed thematic services are based on the complex use of spectral data from the freeware images from Terra Modis, Landsat 8, and also Deimos-1 and RapidEye satellites. Processing of remote sensing data in order to create thematic services is based on the methods of statistical, cluster and factor analysis, methods of pattern recognition, neural and network analysis methods.

Keywords: agroresourses, space monitoring, vegetation control, Landsat 8, RapidEye, field research data, image identification, yield forecasting.

APPLYING THE BASIC FUNCTIONS OF GIS TECHNOLOGIES ON THE ANALYSIS OF HAZARDOUS NATURAL CLIMATIC PROCESSES (ON THE EXAMPLE OF WEST SIBERIAN TAIGA ZONE)

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ABSTRACT

In conditions of dangerous interaction of natural processes and human impact, there is a possibility of environmental disaster leading to significant economic losses. The article describes a research devoted to pilot testing of standardized analytic approaches to hazardous natural-climatic phenomena in different spheres of environmental management. On the example of the taiga zone of Western Siberia, an algorithm has been developed, implementing the basic functions of GIS technology for the purposes of current study. Using the ArcGIS 10.1 platform, a comprehensive information database was created, combining digital and cartographic data on natural hazards conditions and dynamics. In the result, a GIS system "Hazardous natural climatic processes in the taiga zone of Western Siberia" was created, and, using the author's proprietary methods, zoning of the territory based on the environment management hazard degree, was performed.

Keywords: mapping, GIS technologies, hazardous natural processes

APPROACHES IN SPATIAL DATA GEOPORTALS IN ENVIRONMENTAL CONSERVATION - CASE STUDY: NATIONAL PARK IN ROMANIA

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ABSTRACT

In Romania a big problem is the protection of flora and fauna in the national parks. In the European context, environmental initiatives are considered priorities, many of them resulting in the creation of geoportaluri within which data can be found very easily. We have chosen a case study of several geoportals developped in this purpose and we want to highlight specific issues from the perspective of environmental issues and sustainable development. Some of the current resources should be directed to the protected areas management and protection. Therefore, as a condition, are necessary means to evaluate how these activities were successful in meeting conservation objectives. In Romania, lately developed some geoportals through which to achieve a sustainable management of protected areas in order to achieve environmental policies.

Keywords: geoportals, environmental protection, GIS, sustainable development, ESRI technology

ASPECTS ABOUT THE IMPORTANCE OF OBLIQUE IMAGES IN URBAN MANAGEMENT

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ABSTRACT

Oblique aerial images of urban areas have developed a great popularity in the last period, regarding their applicability both in the area of 3D city modeling, urban development and in various cadastral applications, providing information on the heights of buildings, the terrain elevation and the appearance of facades. Taking acount of different characteristics of oblique and vertical images, we try to emphasize the reasons for the oblique images are very appropriate for urban representations. Currently, oblique aerial images are widely available for more cities, but the processing of the images is not fully automated, it being constantly improving. In this article we want to highlight certain aspects of this theme, from Romania and abroad. We want to emphasize new technologies used for data aquisition and processing in the purpose of obtaining 3D city models.

Keywords: oblique images, urban management, city modeling

ASPECTS OF USING MODERN TECHNIQUES FOR ACHIEVING NETWORKS SUPPORT

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ABSTRACT

The paper aimed was to achieve thickening network, by GPS methods in Borod village, Bihor County.

In Romania, the Borod village is located in the Great Depression Vad – Borod, located in the upper basin of Crisul Repede in the northwest of Apuseni Mountains. It borders in the north with Plopisului Mountains, with piedmont hills of Padurea Craiului Mountains and Crisul Repede River waterside in eastern and southern.

To achieve the network support, was used the static method with five dual-frequency GPS receivers L1/L2 Trimble R8 type and two dual-frequency GPS receivers Leica L1/L2 1200 with AX 1202GG antenna. The receivers were set to record data every second.

Last ones embedded radio module which allows them to configure the RTK system. The receivers are of new generation and dual-frequency signals allowing and recording code P. The fact that they can use up to 220 channels allow simultaneous use of both satellite systems GPS-NAVSTAR and GLONASS.

As fixed reference points were established permanent stations Cluj, Bihor, Beius and Zalau, which comply with geometric criterion, forming a shapely triangle. Borod has an area of 12,000 ha of which 9000 ha rural land. To measure an area so large 5 teams worked from which the first four teams were equipped by Leica TCR 850 total station and the last team used the GPS.

The observations of the network have been carried out in two sessions, on different days, and the runtime of a new point was three hours and thirty minutes. Measurements processing was made with the Trimble Total Control V 2.73 software. After processing were determined the following elements: three-dimensional coordinates in the geometric system (x, y, z), in the ETRS '89 system; coordinates of the points in the World Geodetic System (B, L, H ellipsoidal) in the ETRS'89 system; coordinates of the points in the projection of national plane Stereographic 1970. Coordinate transformation from ETRS '89 system in projection plane Stereographic 1970 was made by TransDat V 4.01 program. Network compensation was performed with the program TEREMODEL and for network adjustment was used the AJUSTAMENT option.

After two sessions of measurements on the surface of Borod village, were determined 10 new points to be used in cadastral surveying work needed in the area.

In the GPS measurements campaign for achieving network support of Borod area from Bihor County was confirmed the performance of GPS technology and its advantages compared to conventional surveying methods. Due to the advantages posed by GPS technology, we propose its use in measurements and re-measurements of support networks.

Keywords: coordinates, GPS, measurements, network support, receivers, surveying

ASSESSMENT OF FOOD HAZARD AND RISK USING GIS AND HISTORICAL DATA. CASE-STUDY: THE NIRAJ RIVER BASIN (TRANSYLVANIA DEPRESSION, ROMANIA)

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ABSTRACT

The intensification of extreme events, due to global climatic changes and irrational land use, has materialised in the change of pluvial regime and high precipitation amounts. Thus, the study of flash floods, as a result of the rain-flow process, has an important place in applied hydrologic research. Floods represent a hazard with high frequency and magnitude in Romania, especially on rivers originating in the Carpathian mountain area, with pluvial and nival source. Therefore, the quantification of flood vulnerability and risk is necessary for a better management of priorities in emergency situations. The flood risk zonation is made in applied hydrology through floodable stripes, which are produced using statistical analysis of past data series and their integration in determinist spatial analysis models. The aim of the present study is to identify the flood risk and the vulnerability of infrastructure by determining the floodable stripes of the main river in Niraj basin, where significant damages have been recorded after flash floods. In order to achieve this, the methodology included a statistical analysis of hydrologic probability using recordings from the last 43 years (1970-2013), as well as field measurements (topographic profiles used as computational sections) integrated in GIS databases and complex spatial analysis models. The results of the spatial analysis model are illustrated through the flood risk map, generated as a product of temporal flood probability and vulnerability of the territory. These results can be successfully used in territorial planning projects and in the management of emergency situations, but can also be included in other spatial analysis models of flood risk.

Keywords: flood hazard, risk, GIS, floodable stripes, probability, recurrence interval

CARTOGRAPHIC VISUALIZATION OF BOUNDARIES IN ACADEMIC ATLAS OF THE CZECH HISTORY

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ABSTRACT

The solution of cartographic representation of boundaries was one of the challenging tasks during creation of new Academic Atlas of the Czech History. Main issue for historical thematic mapping is to achieve best possible boundary representation considering combination of historical and present information. Another point to take into account is visualization of other map elements and focus of a map (such as political map, physical-geographical map).

The article summarizes ways of cartographic representation of boundaries mainly in standard atlases (like school atlases or atlases for the general public) but in historical atlases as well and initial demands of historians to thematic maps. These two basic requests led to the design of map symbols and guidelines for their using during the work on the Academic Atlas of the Czech History. The topic is supplemented with other issues which are important to take into account – like an accuracy of original sources, grade of map generalization and so on.

Keywords: boundary, historical boundary, administrative boundary, cartographic representation of boundaries, Academic Atlas of the Czech History

CHATEAUX AND CASTLES IN THE CZECH REPUBLIC: OLD MAPS AND PLANS PROCESSING

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ABSTRACT

Chateaux and castles are an important part of cultural heritage in the Czech Republic. The main focus of our project is to put together all the historical maps and plans of chateaux and castles as well as their historical photographs within the web mapping application. The emphasis is put on the surroundings of the main objects. There are many interesting buildings, parks, sculptures and churches nearby. All these objects can be found on historical mappings or other plan materials.

The processing of old maps is performed during the first phase of the project funded by the Czech ministry of culture. Old maps are collected and georeferenced. After that is the vector data model being created and fulfilled. All these maps and created data are prepared to be used in geographical information systems. Besides map material, 3D models of castles and chateaux can be created. All outputs of the project (georeferenced maps, vector data models, 3D models of castles, buildings reconstruction) are easily accessible by the web mapping application.

Keywords: old maps, georeferencing, cultural heritage, web mapping

CONCEPT OF A GEOGRAPHIC INFORMATION SYSTEM FOR THE PURPOSES OF SPATIAL PLANNING OF DEGRADED AREAS

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ABSTRACT

The negative phenomenon of urban sprawl of metropolitan cities at the cost of agricultural and environmentally valuable areas has been observed for many years. One of the methods of counteracting the phenomenon is directing the city's development to the inside by using areas potentially attractive in terms of location, with expired current management function. These are predominantly industrial areas, frequently distinguished by a substantial degree of degradation. Their revitalisation, often preceded by necessary land reclamation, is a time-consuming and interdisciplinary process requiring undertaking complex and planned activities depending on particular characteristics of a given area.

Decisions regarding related activities are based on obtained spatial and descriptive data. The development of information technologies, particularly including GIS software, provides vast possibilities of data processing, analysis, and visualisation. Even the most advanced analyses, however, will not bring proper results if the input data are not credible, complete, valid, and properly organised in a spatial data base. This is particularly important in the spatial management planning of industrial areas, where wrong decisions can lead to irreversible effects harmful for the environment and health of people.

The article presents a concept of a Geographic Information System designed to support the process of effective spatial planning and spatial management, with particular consideration of degraded and industrial areas. The concept includes a description of necessary source data, their assessment in terms of completeness, credibility, validity, and availability, a proposal of the manner of data organisation in a spatial data base, and example models of spatial analyses. The developed Geographic Information System and models of spatial analyses constitute a tool supporting the process of programming of urban policy, investment activities, seeking of optimal planistic solutions, and identification of potential conflicts in a given area subject to a substantial degree of degradation.

The study area covers the "Myśliborska" combustion waste dumping ground of the Elektrociepłownia Żerań heat-energy plant, located in the Białołęka district in Warsaw (Poland).

Keywords: GIS, spatial planning, city revitalisation, degraded areas, post-industrial areas

CONTRIBUTIONS REGARDING MODERN TECHNOLOGIES FOR THE OPTIMIZATION OF FARMLAND RECORDS

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ABSTRACT

Achievement of the network support – Siria – Ghioroc – Barsa has become a necessity, in order to achieve the systematic registration of all farmland from administrative units (AU) Siria, Ghioroc and Barsa. Actually, the desire was to repair the injustices of the communist regime, concerning the farmland ownership and especially by returning of land which was forcibly expropriated in years „60 ".

Due to the wrong way of this restitution, results a greater fragmentation of farmland, which creates big problems in crop production. Land parcellation was made mostly without field measurements, only using some maps more or less accurate, hence resulted in many discrepancies with reality. Given these considerations, we chose to perform a new network, composed of landmarks distributed uniform within the three AU's (Siria, Ghioroc and Barsa), performing the thickening of state geodetic network by GPS measurements.

The total surface area covered by new geodetic network created is 13.656 ha on Siria AU, 4861 ha on AU Ghioroc and 5174 ha on Barsa. Twenty-five sessions of GPS measurements over three days were made. To determine the coordinates of benchmarks we used geodetic state network points, namely, permanent stations Arad, Beius, Faget, Gurahont; points Class B: Lipova AR01, AR05 Ineu, Sebis AR06 and a point of first order: Curtici. Fifty-two new network points were determined: 21 points on AU Siria, 13 new points on AU Ghioroc and 18 new points on AU Barsa.

New points determined, formed the basis of topographic measurements, which were performed within each administrative unit (AU), in order to draw the cadastral plan for each territorial administrative unit (AU) separately. In this paper, we have referred only to AU Barsa with a total area of 5174 ha, of which 2.836 ha arable land, 225 ha of orchards and nurseries; 1.258 ha pasture, 129 ha meadows, while the remaining area is occupied by forests.

Keywords: GPS measurements, network support, geodetic network state, cadastral plan

CREATION OF THREE-DIMENSIONAL DIGITAL GIS–MODELS FOR ANALYSES OF CONSEQUENCES OF EMERGENCY FLOODS OF OIL ON THE OIL-PIPE LINE “EAST SIBERIA - PACIFIC OCEAN”

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ABSTRACT

Accidental spills from oil pipelines are one of the most common man-made disasters in Russia. An accidental spill can happen from any point of a linear pipeline. Oil may spread over the ground and then, due to landform peculiarities, it may flow down to rivers. Big oil spills attract the attention of the society and usually require some urgent measures from the state authorities. Geographic information systems (GIS) are the most useful tool for solving the problems concerning the analysis of oil spill impacts on various objects. GIS methods provide the simulation of consequences of accidents, as well as the evaluation of environmental and economic damage. GIS technologies also provide developing the three-dimensional (3D) models that make possible determination of oil flow direction and spill length, as well as places of oil accumulation; position and direction of oil patch movement, considering such factors as multidirectional affection of river flow and wind on the spread of oil patch on the water surface. For example in 2006 on the territory of Yakutia was the accident of oil-pipe line Talakan – Vitim, there was chop of oil products in the river basin Peleduy, which flows into the Lena river. The purpose of the study: developing of the three-dimensional GIS model for “East Siberia – Pacific Ocean” (ESPO) oil pipeline at the territory of Yakutia (the Russian Federation) for further analysis of accidental spill consequences. Main results of the study: A 3D model of the land surface is generated using GIS technologies in order to prevent environmental risks caused by ESPO oil pipeline operations. The maps representing a negative impact of the pipeline on the neighbour areas are performed. The validity and colligation of the layers of geographical and specific data provide rapid integrated assessment of the environmental impact and the damage evaluation, as well as forecast of consequences for possible accidental situations along with environmental monitoring is also available. Maps and models developed in electronic format are recommended for forecasting and simulating of possible accidental situations at ESPO pipeline as well as for substantiation of the regional policy in order to optimise the nature management in Southern Yakutia.

Keywords: 3D GIS, oil pipelines, accidental oil spills.

DRAFTING AND FINALIZING OF A PRIVATE PROPRIETY FORESTRY FUND IN SALCIUA NOUA VILLAGE

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ABSTRACT

The present purposes of the paper consist in landscape studies concerning a private propriety forestry fund.

Considering the forest administration point of view, which is a state institution, the private forestry fund has been part of: U.P. III Forodia and U.P. V Honoş, O.S. Timişoara, Timis Forestry Department, National Forest Administration in total surface of 257, 4 hectares.

Geographically, the studied territory is situated in the central part of Timis County, on the neighborhood of Pischia commune, Salciua Noua village.

The study, as a forest landscape arrangement of a private propriety, follows to assure the protection and production functions in order to ensure continuously the ordinary environmental conditions and a superior capitalizing of the wood in strict compliance with the forest regime.

In this way, the forest is treated as a basic unit of production and protection where the regulation of Bioprotection Bioproduction process is similar to the National Forest.

The exploitation and culture plans were drawn for the following ten years, the study contain certain stipulations that ensures in future operational continuity.

In order to determine the surfaces and drawing up maps it has been used plans having level curves scale 1:5000, and othophotoplans scale 1:5000. Topographic measurements using STEREO-70 projection system were executed during the land registration.

Surfaces determination has been done by scanning and digitization of basic plans, by following the steps imposed due to the rigorous control of measurements. STEREO-70, topographic measurements were executed during the tabulation: parcel area digitizing; parcel area compensation on trapeze; computing the landscape unit area; computing the landscape unit area on parcels or parcel groups.

Digitization and compensations operation were executed considering the allowed tolerances.

Keywords: exploitation and culture plans, digitization, computing the landscape, parcel groups

DRAWING A 3D TOPOGRAPHIC PLAN NECESSARY TO ACHIEVE A GRAPEVINE PROJECT ARRANGEMENT IN RECAS CITY, TIMIS COUNTY, ROMANIA

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ABSTRACT

This paper addresses the problem of studying grapevine areas in terms of relief which influences productivity of grapevine by a complex and scientifically knowledge of grapevine exposition; establishment stores culture considering the level curves; the characterization of soles by watershed field analyze, necessary for pluviometric basins establishment.

Recas, is a city that belong to Timis county, Romania. The city statute has been obtained in 2004. Recas city is situated at 21 Km distance from Timisoara and 37 Km from Lugoj, along the national road DN6 (European E 70). The city has access at the Timisoara airport witch is situated at a distance of 20 km.

The administrative territory of Recas has a surface of 22,988.21 ha. Considering the morphological point of view the region is made from hills with gentle or flat ridges that are being landmarks of erosion since long time ago.

The city establishment is in a sunny hills area, which is favorable for agriculture, the city is being crossed by Timis River and Bega channel in South, having in the North part the grapevine hills.

The purpose of the of the present study, consist in gathering information regarding the technical and topographical characteristics to determine the present production capacity for grapevine and for grounding technical and scientifically the most proper practical measure regarding the rational use of Land Fund.

The objectives followed were: identification, delimitation and the land units inventory; determine the condition of supply/ensuring the soils with pluviometric water.

The importance of this work is to determine the shape of the land in terms of altitude in order to optimize the production of vines.

This study contains scientific material for inventory an exploitation of Land Fund for subsequent drafting and choosing the most appropriate technologies to obtain good results on grapevine cultures and also a study of the characteristics of land forms materialized by situation plans, including a systematic review overall operations, identification and characterization of the disposition of the land of SC Recaş, Romania.

Keywords: topographic analysis of landforms, watershed analysis, 3D overall plan

ENSURING INTEROPERABILITY OF GEOGRAPHIC INFORMATION IN LOCAL GOVERNMENT AND INSPIRE

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ABSTRACT

The paper presents a case study which highlights interoperable aspects of geographic information in a local government within the Infrastructure for Spatial Information in Europe (INSPIRE). Special emphasis of data and language heterogeneity specifically is given to the integration of community data within the higher infrastructure levels. The existing 34 data themes needed for environmental applications are referenced in Annexes I, II and III of the INSPIRE directive. The framework for the implementation is given by key components specified through technical implementing rules. The rules enable sharing of environmental spatial information among public sector organizations and better facilitate public access to spatial information across the European Union. For selected municipal data themes, the relation with the implementing rules will be investigated. The considerations are guided by the objectives of searchability, usability, reusability, composability and interoperability of digital data. Based on the current situation in the context of geographic information, data transformation and the usage of standards of the semantic web and ontologies to solve heterogeneity problems in data management are discussed. Cases of interoperability at the semantic, syntactic, and organisational level as well as results of data transformation and cartographic enhancement of local government data within the European spatial data infrastructure will be illustrated in the paper. In that way, we demonstrate how extensive knowledge which is already available for local government data can be used at the European level.

Keywords: Local Government, SDI, Interoperability, Cartographic enhancement, INSPIRE

ESTABLISHMENT OF A METHODOLOGICAL BASIS OF ADAPTIVE-LANDSCAPE SYSTEM OF AGRICULTURE* USING GIS - TECHNOLOGY (ON THE EXAMPLE OF THE NORTHERN SLOPE OF THE ILI ALATAU)

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ABSTRACT

The article usses the principles of drawing up the soil-geomorphological and landscape maps in adaptive landscape system of agriculture (ALSA) of northern slope of the Ili Alatau mountains by using GIS technology. Currently topical issue of fundamental change in the process of formation of agronomic solutions through the introduction of environmentally sustainable farming systems with extensive involvement of the capabilities of modern techniques and technologies, including geographic information systems and computer technology. The system is held in Kazakhstan as a territorial analysis of the classification categories of landscapes and issue of soil, geomorphological and landscape map by using GIS technology to create adaptive-landscape system of agriculture. In this case, the methodological approach the use of GIS technology.

Keywords: GIS technology, adaptive-landscape system of agriculture, agriculture, agrolandscape

FLOOD PREVENTION MAP ON BISTRITA RIVER, ROMANIA

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ABSTRACT

This paper describes the use of video sensor camera, in order to achieve a hazard map in GIS format on sections with flood risk of the watercourse of the Bistrita River.
The project's purpose to achieve the flood hazard maps in GIS format will provide decision makers the possibility of using the local risk maps by simulating possible situations such as flooded area expansion depending on water velocity, depth of flood corresponding flow rates with different probabilities of exceeding them, and also damage assessment and population evacuation plans taking into account the configuration of the terrain and the locations that can be used in these exceptional circumstances.
In order to obtain the results we collected images with the Hirrus UAV build by Team Net Company. After analyzing the data, the next step was obtaining the digital model of the watercourse and the adjacent area. Besides aerial survey we used measurements made in the field with a GPS on the flight route marked previously. These data formed the basis for editing maps in GIS format.
The main purpose is effective territorial organization for the operations in case of floods. The first reactions to the establishment of the state of emergency are important to reduce damage. Of course, a good plan of action in place, involving low cost with maximum results is needed. Such flood prevention map serves these goals. Simulation of possible situations will help create rapid intervention schemes adapted ground phenomena.

Keywords: Flood, Bistrita River, UAV Hirrus, prevention, damages.

FLOODPLAIN LANDSCAPE MANAGEMENT BASED ON GIS AND REMOTE SENSING DATA. CASE STUDY BUZAU RIVER

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ABSTRACT

One of the most important environmental issues which Romania faces as member of the European area is land management and natural resources exploitation within protected areas. A good example is the Natura 2000 ROSCI0103 Lunca Buzaului (Buzău and Brăila Counties, Romania). This protected area was established with the purpose of conserving habitats and species characteristic of aquatic and riparian ecosystems, in a region with significant anthropic stress generated by alluvial deposits exploitation, waste storage, agricultural activity, and hydro energy producing potential.

The need to put such area in value requires an integrated approach, based on the use of GIS and remote sensing data.

In this study, the following resources have been used: Pléiades panchromatic and multispectral images at 0.5 and 2 m spatial resolution, orthophotos with a 2.5 m spatial resolution, a digital terrain model (DTM) based on a 30 m network, topographical plans with 1:5000 and 1:10000 scales, thematic vectors for land using – after Corine Land Cover 2006 data sets. The time difference in the acquirement of images, the exploitation of all the aforementioned data, provides the possibility of having a time scale perspective, between 1970 and 2012.

The data have been processed using specific software – ArcGis 10.0 for management of spatially referenced data, ENVI EX for remote sensing data processing and RockWorks 12 for geological and hydrogeological data processing.

In the next step, processed remote sensing data, correlated with field collected data has led to the following processes:

- Design of the flooding areas, along Buzău River and an environmental impact assessment associated with different scenarios;
- Evaluation of actual fluvial erosion processes for the Buzău River system, both under natural state and influenced by the alluvial material extraction activities which are taking place in the area.

From geomorphological point of view, the specificity of this habitat is given by the pronounced dynamic processes and, consequently, by the necessity of efficient land management.

The results related to the extension of flooding areas at different flow rates, morphological instability, and the presence of erosional risk sections, have been

correlated with land use characteristics (from Corine Land Cover) for the entire studied region.

Obtained results: GIS data base, flooding and geomorphological risk maps. All these are useful useful for developing effective management plans in order to achieve conservation objectives for species and habitats, for mitigating environmental impact, and for elaborating a geological resources sustainable exploitation strategy.

Keywords: GIS database, land management, remote sensing data, Natura 2000, flooding risk.

FRAMEWORK FOR PROCESSING RIVER BANK POINT CLOUDS GENERATED BY TERRESTRIAL LASER SCANNING

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ABSTRACT

TLS is a cutting edge technology used to map land surface features and it is a source of high resolution DTMs. Used in mapping river banks, this technology is able to deliver high resolution models of these geomorphologic and hydrologic features. While the processing of DTMs obtained using TLS technology is similar with the processing of DEMs obtained using LIDAR technology, several features of the river banks require operations that are different compared with the operations on LIDAR DTMs. In this context, a script for GRASS GIS package was created, in order to create a generic framework for generating and analyzing DTMs of river banks and obtained using TLS. While the script is created to be used with GRASS GIS, the logic of the framework can be used to port the framework in any GIS package that has enough scripting capabilities.

Keywords: river bank, DTM, TLS, GRASS GIS

GEOANALYSES OF DATA ON FIRE OCCURENCE IN THE SLOVAK REPUBLIC – CASE STUDY

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ABSTRACT

In the paper we introduce an approach for analyzing the data on fire occurrence in the territory of Banska Bystrica region, and to evaluate the most risky localities from the different fire type point of view. To build the fire geodatabase we used the data that are collected at the Fire Research Institute since 1996 and to process the analyses we used the tools and functions of the ArcGIS 10 Desktop environment. In this paper we introduce the results for the period 2004 - 2013. The results of such analysis are necessary for providing the fire risk analyses, statistical evaluation of fire incidents trend and for fire investigation purposes.

Keywords: Analysis, Banska Bystrica, fire incident, GIS.

GEOPOTENTIAL OF THE LANDSCAPE FOR URBANIZATION EVALUATED IN GIS ENVIRONMENT (AT THE EXAMPLE OF MICROREGION MINCOL, SLOVAKIA)

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ABSTRACT:

Contribution is dealing with assessment of potential of microregion Minčol for urbanization. Potential for urbanization we understand as suitability of natural preposition within landscape for construction of housing, industrial and other areas. Suitable character of georelief, suitable weather conditions, close watercourse, fertility of soil etc. created ideal potential for the establishment of residential units of varying sizes. Goal of this paper is to analyze potential of landscape of Minčol microregion for urbanization on the base of setting degree of suitable potential and his space differentiation in this microregion. Determination of the main criteria affecting urbanization, a marker of significance, and then summing the point values we have received various degrees of suitability of potential.

Keywords: potential for urbanization, landscape assessment, landscape potential, microregion Minčol

GEOSPATIAL MODEL FOR VISUAL RECONSTRUCTION OF USERKAF'S PYRAMID AT SAQQARA, EGYPT

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ABSTRACT

The pyramid of Userkaf, the first king of the 5th Dynasty of Ancient Egypt (ca. 2494-2487 BC) is one of the World Heritage monuments located on Saqqara plateau Necropolis in Egypt. Like most of the Ancient Egypt's monuments, this pyramid is almost in ruins and its preservation is a challenge for modern conservators and engineers. Currently, the pyramid is in a very bad condition and most of the main building elements can be recognized only thanks to the previous archaeological studies carried out on site. The structure of the pyramid is also severely affected by earthquakes. The elaborated 3D model of the pyramid allows us to make conclusions regarding the building process of the pyramid, to evaluate the stability and current state of preservation of the pyramid's stone material and mortar, as well as to reconstruct initial shape and dimensions of the monument.

Keywords: Stone monument, photo documentation, weathering, visualization, 3D model

GEOSPATIAL TECHNOLOGIES FOR THE 3D RECONSTRUCTION OF CULTURAL LANDSCAPE – A CASE STUDY OF A VANISHED TOWN IN NORTHWESTERN BOHEMIA

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ABSTRACT

During the last decades, cartographic works depicting landscape in the past, when converted to a digital form, have been efficiently used as important documentary data for the research and examination of landscape changes. Digital copies of stable cadastre maps from the 1840's, large-scale maps of the 1950's and contemporary spatial data of the 21st century have served as the main data sources for detecting and analyzing the changes in the region of the extinct town of Přísečnice. 3D models of the former town center with a number of buildings, including the church from the 16th century, have been constructed and visualized on the website containing animations and perspective scenes (www.prisecnice.eu). The paper presents the application possibilities of geospatial technologies for keeping the cultural landscape heritage and making it available for interested target groups or the general public.

Keywords: geospatial technologies, 3D model, landscape development, vanished town, web visualization

GIS METHODS IN EVALUATION OF ARABLE SOILS' SPATIAL-TIME EROSION DYNAMICS ON THE TERRITORY OF THE RUSSIAN PLAIN

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ABSTRACT

The aim of the research was to devise a method for analyzing the spatial-time dynamics of soil erosion intensity under conditions of high agricultural production. Soil maps on a scale 1:10000 made during the period from 1970 to 2007 according to the State programme were taken as a base for the research. Spatial-time analysis of soil erosion was conducted using the creation of vector thematic erosion maps. The vectorized relief map was used to create elementary river basins for second and third order tributaries within the key areas, chosen according to a number of conditions. The following analysis of the spatial distribution of soil erosion in the region was made according to the created river basins.

Keywords: soil erosion, soil map, GIS, river basins.

GIS-A TOOL FOR MONITORING AND MANAGEMENT OF EPIDEMICS

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ABSTRACT

Our aim is to identify, evaluate and catalogue Romanian ecosystems at risk and environmental conditions linked to global change, which can influence the spatial and temporal distribution and dynamics of West Nile virus. The project innovation integrates health-environment investigations combined with spatial data (satellite imagery) and with epidemiological data. The eco-geographical diversity of the project study areas covers relevant Romanian eco-systems. The virus circulation is studied within a scientific framework involving key-elements of the Landscapes, Vector and Parasite bionomics, Public Health, human activities and Animal Reservoirs and will be linked together by a series of integrative activities that include environmental change detection, disease modeling, remote sensing and image interpretation.

Keywords: GIS, topographical maps, satellite images, ecosystems at risk and environmental.

GREEN VERSUS RED: EYE-TRACKING EVALUATION OF SEQUENTIAL COLOUR SCHEMES

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ABSTRACT

Methods of cartographic visualization are closely related to the use of colour schemes. There are a number of coloured scales that are included in the default menu of GIS and graphic software, but the appropriateness of the colour scale is in many cases questionable – not only because of the thematic suitability, but also with the focus on the user ability to get the information provided in the map. In addition to choosing a suitable colour scheme it is also very important to select number of intervals that can be used for various base hues.

The main goal of this contribution is to describe design and results of an eye-tracking experiment, which was aimed at evaluating the efficiency of two different sequential colour schemes. The research is based on the theory which states that the human ability to distinguish colour shades in various parts of light spectrum varies. Some colour brightness continuum could provide more discriminable shades than another one. Within presented study only brightness continua of green and red were evaluated. Experimental stimuli are represented by 6-classes choropleth maps. The design of applied sequential colour schemes was developed based on results of the previous research. Colour distance steps between classes of both colour schemes are given by values determined by the method CIEDE2000 ΔE_{00}= 6, 8, 10, 8 and 6.

The presented experiment was carried out in a controlled eye-tracking laboratory in which participants were asked to find depicted area on the choropleth map and match it with the corresponding legend class by its colour. Eye-tracking methods were utilized to complement usability metrics such as measured accuracy, time to answer and selected eye tracking metrics: fixation frequency, fixation duration, scanpath speed and other scanpath characteristics comparison.

Eye-tracking technology is one of the modern trends in assessing the suitability of different methods of cartographic visualization and generally on the assessment of user aspects in cartography. The right choice of visual variables, including colours, is a fundamental determinant of successful transfer of information from the map to the user.

Keywords: Eye-tracking, Choropleth maps, Usability, Colour, CIEDE2000

HIGH RESOLUTION IMPERVIOUS AND TREE COVER LAYERS AS AN ADDITIONAL SOURCE OF DATA ON LAND COVER STATUS IN POLAND

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ABSTRACT

European Copernicus (former GMES) GIO Pan-EU Land Monitoring service is to provide land cover information to users in the field of environmental and other terrestrial applications. The GIO Land Monitoring service includes CORINE LC inventories and the 5 high resolution layers (HRLs) that characterized 5 main land cover types: impervious areas, forest, permanent grasslands, wetlands, and water bodies - for the reference year 2012. The HRLs are generated using automated image classification by external service providers [2].

This presentation is focused on the analysis of the two HRLs: impervious areas and tree cover layer. We have performed the verification of both HRLs against the available national in-situ data. The preliminary results of the accuracy assessment showed overall relatively good agreement between the provided HRLs and in-situ data. The disagreement was identified over the scattered settlements, patches of mature orchards or mountains forest. The HRLs can be a valuable, additional source of up-to-date information on land cover status.

Keywords: land cover, land cover changes, HRL, imperviousness, tree cover

IDENTIFICATION AND MAPPING OF THE ETHNO-ECOLOGICAL-ECONOMIC CONFLICTS OF NATURE USE IN SOUTHERN YAKUTIA (NORTH-EAST RUSSIA) USING GIS

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ABSTRACT

Situations arising from human actions leading to violation of legally defined state of the environment, causing damage to any field of nature management, are defined as conflict. Problems of conflict research carrying out in order to provide the protection of the environment, to ensure the rational use of natural resources and their reproduction, are actually very urgent for Northern regions where the natural, social and economical situation is really complicated. The Sakha (Yakutia) Republic is one of such regions, characterised with great biological diversity as well as with the potential of natural resources that has a rather complicated structure of its components and territory, and with specific conditions of its exploitation. The purpose of this study is to determine both negative impacts and conflict situations in the nature management of the Sakha (Yakutia) Republic by using the cartographical method that had been applied for systematisation and spatial analysis of conflicts being exposed. Implementation of cartographic research method and GIS technologies makes possible complete spatial, temporal and system analysis of all nature-management subjects and objects, as well as it allows to analyse and simulate all conflict situations arising from interactions in the "nature – population – economy" system. Describing sources of conflicts, maps contribute to choice of better ways of conflicts' solutions as well as of most adequate forms of nature management in conflict areas, also giving some advise for elimination or moderation of conflicts. The following results having some scientific novelty had been obtained during the study: 1) Some conflict situations arising due to unpractical nature management in the Sakha (Yakutia) Republic are identified and classified. 2) The series of specific maps of negative impacts and conflict situations in the Sakha (Yakutia) Republic are developed for the three levels such as republican, ulus (district) and local. 3) An integrated cartographic evaluation of consequences of negative impacts and conflicts for the nature management in the Sakha (Yakutia) Republic is performed.

Keywords: nature management; indigenous peoples; ethnic, environmental and economic conflicts; North East of Russia; Yakutia.

IDENTIFICATION OF HOMOGENEOUS SPATIAL PLANNING ZONES WITH THE USE OF STATISTICAL CLUSTERING METHODS

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ABSTRACT

The aim of the paper was both to present the possibility of use of the method of the search of space with specific features and identify the fragments with similar features. The described method was designed to automate the operation of original hybrid method in the field of space planning grouping of similar spatial parameters. Extremely useful seems to be here digitization of spatial data, underlying geographic information system. The hybrid method combines methods of spatial assessment and valuation (Bajerowski's method), numerical taxonomy (Ward's method) and axioms of the theory of planning spatial use (totality axiom). The article describes the principles of group planning space using the Ward's method.

The algorithm was tested on one of the rural districts of Warmia and Mazury (Poland). The application demonstrated the effectiveness of the method in grouping the planning of homogeneous features. Assumptions of method are universal and can be used depending on purpose of the search by the wider group of stakeholders.

Keywords: GIS for sustainable development, spatial data, spatial planning, Ward's method.

IMPLEMENTING INSPIRE COORDINATE TRANSFORMATION SERVICES - ROMANIAN INSPIRE GEOPORTAL

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ABSTRACT

The most important legislative effort towards creating an European Spatial Data Infrastructure, the INSPIRE directive, has pushed all the member states to effectively implement the means necessary to expose all their existing and future data in a standardised manner.

Interoperability is the most important concept of the INSPIRE directive. On the one hand, there is this goal to have a set of fully interoperable European National SDIs that can be brought together to form a unified European SDI with no effort. On the other hand, in order for anyone who gathers multi-state data from INSPIRE sources to be able to seemingly and successfully integrate it in a single dataset, it is required that the data not only respects the unified schema and formats, but it must also be as spatially accurate as possible.

This is where the INSPIRE Coordinate Transformation Service (CTS) comes into place. The CTS, borrowing from its siblings, the View service and the Download service which are profiles of the WMS and WFS specifications, is a profile of the OGC's specifications of the Web Processing Service.

In the spirit of the openness promoted by INSPIRE, this paper will show how the CTS was implemented using open-source tools from both private organizations and from public institutions, the latter also providing the authoritative methodologies and data necessary to achieve the goal of offering a high-precision, easy to use, and compliant coordinate transformation service. It will also be presented what was done in order to compensate for the low number of WPS compatible clients and add value to the already interoperable service by means of a public offering that is easy to reach and use by the average spatially-enabled user, without going through the hassle of obtaining and learning to use new tools.

In the end, this paper will conclude by presenting some possible advanced optimization techniques that can harness the power of modern CPUs and GPUs in order to build very fast, time-sensitive coordinate transformation services, that we can rely on when needing to transform very large quantities of data in a very timely fashion, without sacrificing any of the interoperability demanded from the service implementation in the first place.

Keywords: INSPIRE, Network Services, Coordinate Transformation

INFORMATION SYSTEM FOR EASY ACCESS OF THE FIRST MILITARY SURVEY

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ABSTRACT

The First Military Survey is a unique collection of maps and descriptive information covering the whole former Austrian monarchy dating back to 1760s-1780s. The First Military Survey contains both cartographic and textual material. The description of landscape according to the individual sections of the 1:28 800 map was carried out simultaneously with the map. However, the texts are in a form of narration, they are in strictly structured every section into description of single municipalities, "Extract", where the entire region is summarized by subjects, and index of places. The aim of this project is to turn this comprehensive topographic work into a digital library offering the user all the information contained in the original work in a comfort internet environment. The old maps are carefully georeferenced into a seamless map and the descriptive information is processed into a database. The resulting information system will be available in Czech and German as all the texts are being edited and carefully translated.

Keywords: Ist Military Survey, Bohemia, 18th century, scientific edition, on-line accesible information system

INTERPRETING RESULTS OF A GIS-BASED LANDSLIDE SUSCEPTIBILITY ASSESSMENT USING GEOTECHNICAL INVESTIGATIONS FOR A ROAD SECTOR IN NORTH-WESTERN ROMANIA

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ABSTRACT

A landslide susceptibility assessment was performed using the statistical method of logistic regression in a 100 km^2 area from north-western Romania. The methodology was based on GIS techniques of spatial analysis, previously mapped landslides in the field and the assumption that future landslides will occur under the same circumstances as the ones from the past. The results were validated using an independent set of landslides and showed a good agreement with observations from the field. A project involving stabilising measures for a road sector crossing the study area and connecting urban centres of regional importance gave the opportunity of comparing the statistical results with geotechnical investigations performed at six drilling points by a local geotechnical firm. Further field observations led to a more detailed mapping of the two major landslides intersected by the road sector and the mapping of more recent, smaller landslides. The interpreting of the geotechnical investigation results concluded in identifying the relative depth of landslide slip surface at the analysed points, confirmed by the Bishop model at a relative depth of 4 and 3 m, and highlighted the main lithologic characteristics of the sedimentary deposits involved in landslide activity. Appropriate measures for slope stabilisation near the road sector were also produced in the project and critical considerations about the results of the statistical model used in the first stage of analysis are made. In addition, several interpretation restrictions are advised to local and regional users of the landslide susceptibility map.

Keywords: landslide susceptibility, logistic regression, GIS, geotechnical investigations

INVESTIGATION OF DIFFERENT VISUALISATION METHODS FOR CRIME MAPPING

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ABSTRACT

There are a quite many GIS application available on the internet showing crime statistics all over the world. The usual visual methods for these statistics are generally pictograms and point symbols. These visualisation methods raise two problems that they are not able to transmit the real crime situations to the users, because it is not easy to interpret the content of it. The other problem is that they may harm the confidelity of the victims. Therefore in this study the authors tested the applicability and effectiveness of other visualisation methods.

Keywords: crime mapping, visualization, usability study

LANDSCAPE CHANGES IN THE NORTH-WEST BOHEMIA AND THEIR VISUALIZATION

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ABSTRACT

North-West Bohemia (Usti nad Labem region) is one the most affected areas in the Czech Republic regarding to landscape changes. This region suffered from three main activities during last 100 years. First, the area contains large brown coal basin, and such area has changed much during heavy mining industry. Next activity, also connected with open-pit mines is creation of large water dams. Here, part of the landscape disappeared under the water. Last but not least, the Usti region suffered from the settlement extinction caused by the political situation in Czechoslovakia after World War 2.

Our project is focused on processing of maps, photographs and related material for reconstruction of the landscape before three main activities mentioned above, and on visualization of changes in the landscape during last 100 years. The work is supported by the Czech ministry of culture by the program of National Cultural Identity. Project "Landscape reconstruction and vanished municipalities database for preserving the cultural heritage in the region of Usti nad Labem" is planned to be solved in 2012-2015, and first outputs of the research are available now.

Processing of old maps was the first step of the project. Historical topographic maps were collected and properly georeferenced. For all topographic map series published in the last 200 years and covering the whole area of Usti region we created seamless map in current reference coordinate system. Maps of the higher scale (e.g. cadastral maps) were georeferenced selectively because of enormous number of map sheets. All maps are prepared to be used in geographical information systems and are the main inputs for the landscape analysis. Old aerial photographs were processed and georeferenced as well.

The process of landscape reconstruction can vary in techniques used during the work. The first analysis was based on the changes of land use within selected areas. The changes are identified for time intervals based on interval of publishing of maps. Using aerial photographs or contour maps is another option. Here the reconstruction of the landscape in 3D is performed. In detail, if appropriate plans or photographs are available, it is possible to reconstruct vanished settlements and the individual buildings.

All outputs of the project (georeferenced maps, vector data models of land use, 3D models of landscape, buildings reconstruction) are easily accessible by the internet application.

Keywords: old maps, landscape reconstruction, georeferencing, web map application

LOGISTIC MODELLING TO HANDLE THE THREAT OF FLOODS – THE BODVA RIVER EXAMPLE

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ABSTRACT

The objective of this paper is to provide an overview on the flood issues as handled in the project HUSK/1001/2.1.2/0009 "Flood modelling and logistic model development for flood crisis management". A particular part of the project is the preparation of data for logistic modelling of floods management. Comprehensive data attributes linked with the spatial objects are a valuable source of information especially in decision-making processes.

Keywords: flood, floods management, spatial data, GIS, database

LOW COST VIDEOLOGGING AND GEOREFERENCING AS A COMPONENT OF THE ROAD MANAGEMENT SYSTEM

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ABSTRACT

There is a wide range of available technologies that can serve as a tool for gathering road data. Most equipment used for data gathering for the Road Management System are relatively expensive, with a varying accuracy, from proximate to very accurate measurements. The main principle of all equipment is video-logging and geo-referencing of all gathered data. To every spot of the road (crossing, slide, breaking, bridge, and culvert) corresponds the respective geo-referenced photo, including spatial coordinates and other attributes that can be entered from other installed equipment. The challenge is to choose the right technology, taking into account the need for data and the operating environment. [1] In this study we describe a new product: DBVL 5 **(Database Video-logging 5)** as a possible low cost alternative. Taking into consideration the superiority of the Open Source technologies, a Cannon Legria FS 2000 camera and a GPS Trimble (Model Juno) receiver, we have created a programme to perform the processes of **Video-logging** and geo-referencing during a single terrain site visit. This product has been tested in the inventory of a part of secondary and local roads in Albania.

Keywords. Video-logging, geo-referencing, inventory

MAPPING OF RISKS FOR NOT URBANIZED TERRITORIES

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ABSTRACT

In this article problems of an assessment of a complex indicator of environmental risks for not urbanized territories with application of GIS-technologies are considered. Using a method of the analysis of hierarchies the main are allocated risk factors of not urbanized territories and their importance is defined. For distribution calculation risk factors on the territory, determination of their values in each location and the spatial relation of locations of measured sizes, it is constructed cartographical estimates of a complex exponent of risk of not urbanized territories. The cartographical model represents the flowchart of a set of the ordered operations with cartographical data for decision-making process modeling about spatial objects. Reliability of a method significantly increases in a case of ranging of territories of rather small area with big variability of characteristics risk factors.

Keywords: geoinformation systems, bank of spatial data, territory classification negative effects of the natural and anthropogenic origin

MEASURING INHABITANTS QUALITY OF LIFE USING GIS-BASED ACCESSIBILITY ANALYSIS

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ABSTRACT

One of the important tasks of local governments is to ensure the adequate level of the quality of life (QOL). An important component of this evaluation is the level at which the demands of the society members are met. The nature of the demands varies from material to cultural and organisational needs; the most important demands include the access to food, healthcare, education, recreation, social care, safety services, administration units at various levels, centres of culture and public communication [1]. Inhabitants have an easy access to facilities or services which meet their demands, when such facilities or services are located close to their places of living. The majority of analyses performed by urban experts and planners have for many years considered the estimated proximity. Currently available, advanced spatial analyses allow for calculation of the real distance and time of passing the road section and for creating, on that basis, zones of the real (close to the reality) accessibility of facilities and services in the urban space, where pedestrians may move along the specified routes only. That is why the objective of studies was to perform network analyses presenting the accessibility to facilities and services for the inhabitants of one of the Warsaw districts. Selected categories of facilities were considered: food stores, health care units, city transport stops and community centres. Results of particular analyses were combined and the final map of the accessibility of facilities and services for the district was obtained; it visualised the aspect of the quality of life of inhabitants. Residential buildings were also classified with respect to the location within a given zone of suitability.

Keywords: quality of life (QOL), network analysis, accessibility of services

METHOD OF ERROR ASSESSMENT IN IMAGE CLASSIFICATION

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ABSTRACT

The article describes a method for the determination of error rate in automated image classification and the improvement of accuracy of results by the filtering using the selected vector datasets of ZABAGED (Fundamental Base of Geographic Data in the Czech Republic) in geographic information system (GIS). The principle of method is based on metric spaces and uses the interpretation of three types of metrics: euclidian, time and thematic. In our case, the evaluation of error rate of the classification results is based on the thematic distance. Special method of assessment was proposed for this type of distance and its essence is a classification tree encoded into chain codes. The distance between values of thematic data is determined by comparing their chain codes. The method is semi-automatic with controlled degree of objectivity of achieved results. The proposed method was tested in the project of data analysis of storage of gas facilities under certain types of terrain surface in the Czech Republic (CR). This analysis was done in order to determine reproductive values of gas facilities (pipelines) and the valuation of costs which would be necessary to spend for building new networks. The authors solved this project for the GasNet, Ltd. Company which is a part of a RWE group in the CR. Input data were raster datasets of orthophoto with the resolution of 25 cm/1 pixel and vector layers of the route of communications of the ZABAGED CR. Due to the territorial coverage of the CR with the area of 64,350 km^2, these were massive tasks with data volume of 500 GB. The whole data analysis was carried out in ArcGIS 10.0 environment with using purpose-built applications in Python language with support for ESRI libraries. The used technology of data analysis demonstrated the low error rate in the range of 2% - 3% on the whole modeled area.

Keywords: Error assessment, image classification, GIS

MODELLING AS A PLATFORM FOR LANDSCAPE PLANNING

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ABSTRACT

The objective of this contribution is to interlink the approaches of urban and landscape planning process which use 2D and 3D models into the complex spatial landscape planning at the methodical level.

History of landscape and urban planning shows that the territories are able to reflect not only human needs, but also their abilities and ideals. Therefore the role of complex spatial planning and visualisation of specific changes of the cities and country using 2D and 3D models is very important. Currently, territories are going through immense, uncontrolled changes, which are leading to the irreversible changes of urban environment and also surrounding landscape. These territories, as well as living organisms, must respond to these changes and continuously transform their structures. This article emphasizes the need for creation of a stable platform for complex spatial planning with two main features – interdisciplinarity and transdisciplinarity.

The contribution of complex spatial planning using modelling lies in the creation of quality outcomes which help to identify impacts on the environment and residents. The 2D and 3D models of cities and surrounding landscapes serve a very important function in the decision-making phase and also in the phase of draft measures to mitigate negative impacts on the environment as well.

This rational approach to the complex spatial planning connects the knowledge of many scientific disciplines, it can be applied in practice and shows the relevancy not only for future forms of land use but also for professional users, such as researchers, architects, designers, planners etc.

Keywords: urban model, landscape model, landscape planning, 2D and 3D models.

MONITORING VEGETATION AREAS THROUGH SATELLITE IMAGES. NDVI IN SOUTHERN PART OF OLTENIA PLAIN (LEU-ROTUNDA AND DABULENI AREAS)

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ABSTRACT

Detection of environmental change using satellite imagery and ArcGIS software in an area with agricultural use, affected by atmospheric drought, deforestation and destruction of the irrigation system proved to be important for observing trends in changes over time. Fields Leu-Rotunda and Dăbuleni (Plain of Oltenia), located in southern Romania, represent vast stretches of plains, with sandy soil texture of low fertility and high thermal conductivity. The humus content being 0,2-0,9%, and the plants wilting coefficient ranging from 1,1 to 2,1%. The maximum temperature of the air in July 1993 reached 42,8 º C and 69,5 ºC at the surface of the soil in July 2002. The impact of the climatic elements were detected with the help of satellite images, using the statistical and mathematical method (NDVI). The timing was the month of maximum water requirement, the month of July. In the same month, different conditions have been observed with significant differences of affected polygons for the years 1987, 1993, 2006, 2007 and 2009.

Keywords: Fields Leu-Rotunda and Dăbuleni (Plain of Oltenia), sands, atmospheric drought, NDVI, affected areas.

NEW GEOMETRIC SOLUTIONS FOR WEB MAP TOPONYM PLACEMENT

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ABSTRACT

The paper gives an overview and proposes solutions regarding to the most common mistakes for toponym placement for the best known and most-used web maps and GIS services where toponym placement is not harmonized with the cartographic principles, cartographic visualization conditions or cartographic generalization rules. The problem is solved by use of geometry where toponyms or toponym letters are approximated with a rectangle and/or with a rhombus for italic letters. In the end, we introduce the concept of predicting the path along which a toponym label can be placed through a simple geometry test for intersections of lines and rectangles. Approximations of words or single letters of a word with rectangles or rhombuses is offered as a simple solution for web map label placement calculations in real time which makes it convenient for web maps.

Keywords: Toponym; Placement; Web map; Collision; Overlap

POSSIBILITIES OF THE DEFINITION OF CITY BOUNDARIES IN GIS – THE CASE STUDY OF A MEDIUM-SIZED CITY

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ABSTRACT

In geography, boundaries of urban space and a city itself are usually defined by means of administrative boundaries. These, however, are defined in different ways and therefore very often ignore a real physical boundary of urban (built-up) space. Existing studies have defined city boundaries using remote sensing methods, which can in many cases be replaced by analyses carried out in GIS (geographic information system) environment. The authors of the paper describe several methods of possible definition of city boundaries by means of the density of a road network and public transport. As a complementary analysis, the definition of a catchment area is carried out using the buffer zones around a public transport network. This area is then defined as a city, too. The analyses of the city of Olomouc describe other possible methods of definition of city boundaries, which may be used for cities of similar size and nature.

Keywords: city boundaries, GIS, road network, remote sensing.

PRAGUE URBAN FORM FEATURES AND THEIR IMPACT ON TRANSPORT SUSTAINABILITY

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ABSTRACT

Modern cities all over the world face the number of problems: urban population growth, environmental pollution, noise in the cities, rapid urbanization of natural areas, etc. Urban sprawl leads to increase of built-up areas, as a result of which, strengthening of negative impact on the environment occurs. At the same time, suburbanization often characterized by inefficient land use, because it contains low-density residential area with undeveloped system of social amenities and without appropriate transport accessibility. Many modern cities are unable to provide a growing population of necessary social infrastructure. Many studies indicate a strong relationship between urban form and transport system. The most popular theory suggests that the higher urban density means the lower transport energy consumption. But whether the density is the main factor affecting transport energy consumption and development of transport system. This paper presents a new perspective on the interaction between land use policy and transportation using GIS analysis. The case of study is Prague city. We use statistical data derived from Czech Statistical Office, census and Czech Office for Surveying, Mapping and Cadastre to analyze the urban structure of Prague city and its relationship with the transport system.

Keywords: urban form, transport system, land use, urban density, transport energy consumption

QUALITY ASSESSMENT OF DIGITAL TERRAIN MODEL DERIVED FROM LIDAR

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ABSTRACT

The paper aimed to present the main issues related to the altimetric quality evaluation of the Digital Terrain Model (DTM) derived from airborne laser scanning. The DTM data was stored in a TIN (Triangulated Irregular Network) data model. The DTM quality assessment was made based on a reference dataset that contains points colected in the field using geodetic methods. The reference data fairly evenly covers the tested area. The quality evaluation was based on the quality element, principle and procedures mentioned by ISO/DIS 19157 (Geographic Information-Data quality) standard. In altimetric accuracy assessment, it was used the gridded data positional accuracy [5], in a sense that the closeness [5] was calculate as the difference between the interpolated value from TIN surface and values accepted as being true from the reference dataset.

Keywords: quality control, chi-square, DTM, TIN, LiDAR

REALIZATION OF OPENSTREETMAP PROJECT POSSIBILITIES: SPECIAL GIS SOFTWARE DESCRIBED BY USING CASE STUDY OF TRANSPORT INFRASTRUCTURE

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ABSTRACT

OpenStreetMap (OSM) is a project which aim is to create a free editable world map. Success of this project and, especially, free access to its data pushed a number of research groups and institutions to use its map in different ways and/ or to work with it as an information source. Also OSM data became a base for an amount of specific GIS programs and packages which are commercial and, thereby, is not opened for free use.

The main components of OSM project will be described briefly within the scope of this article. They include approaches for map production and edition, download of OSM data, usage principles of OSM information source, OSM data structure and their elements, overview of services and applications which use OSM and its data in a varying degree.

The second part of the article will be connected with presentation of special OSM-based GIS software: its objectives, possibilities, functions and perspectives. OSM data about transport infrastructure was chosen as an object to clarify existing software features and their usage. With help of this example, the following software possibilities will be shown: OSM data download, their processing and classification, analysis and interpretation of OSM data concerning selected object, creation of different outputs including visualization.

Keywords: OpenStreetMap, GIS software, OSM data, data analysis, transport infrastructure

RECOMMENDATIONS FOR ALTERNATIVE DESIGN OF MLBS APPLICATIONS

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ABSTRACT

Despite the continuing improvements of handheld devices and wireless networks for mLBS applications, their capabilities will never truly compare to those of desktop computers and wired networks in terms of technology, specifically - their display (e.g. smaller screens), interaction (e.g. slower input controls) and performance (e.g. lower transmission rates). Therefore, the main question would be how to improve the usefulness of handheld devices through which mLBS applications communicate by using geovisualization. This research has multiple objectives: to compare and evaluate alternative types of cartographic representation, presentation and interaction techniques for the mLBS medium, to compare the usefulness of modern navigation software, to trial and assess the effectiveness of the UCD methodology in improving the usefulness of mLBS applications, and to make general recommendations for creating useful mLBS applications. Geospatial information nowadays involve the delivery of highly functional and interactive digital cartographic products and its associated content to mobile users in an easily portable format by using current technologies still growing more advanced, and wireless cartographic services, which utilize the mobile Internet, along with the location of handheld devices. All that in order to deliver personalized applications to users, which would exploit pertinent geospatial information about a user's surrounding environment, their proximity to other entities in space (e.g. people, places), and/or distant entities (e.g. future destinations), in real-time.

Keywords: navigation, mLBS, presentation, visualization, usage

REQUIREMENTS FOR A WEBSITE SUPPORTING SOCIAL PARTICIPATION IN SPATIAL PLANNING AT THE COMMUNE LEVEL

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ABSTRACT

Social participation is of high importance in the spatial planning process in Poland, particularly at the level of communes. Works are being currently conducted in Poland on the standardisation of data models, and the incorporation of spatial information regarding spatial management plans in the National Infrastructure for Spatial Information, constituting the implementation of the INSPIRE directive. The availability of digital data and development of IT systems, and particularly GIS and web services, permits the development of websites supporting the society's participation in the procedure of execution of planistic documents at the commune level.

The article discusses the manner of practical consideration of social participation in spatial planning in Polish communes. It provides a short description of the procedure resulting from legal acts. It also presents an overview of the possible web application supporting the society's participation in spatial planning. Geoinformation websites are systems based on spatial data with cartographic visualisations developed on request of the user and according to the user's needs. The distribution of spatial information occurs through web applications which in addition to displaying the map, permit the control and interactive modifications of the image and the scope of content. One of the most important advantages of such applications is the possibility of integration of geoinformation services, e.g. the display of reference data: topographic, cadastral, or photogrammetric data, collected in the national geodesic and cartographic databases.

The basic functional scope of the geoinformation website dedicated to social participation should not only include the typical image management tools, i.e. changes in map magnification (zoom), territorial range (view dragging), and modifications in the scope of content by switching display of thematic layers. Database and analytical functions will be of key importance, including among others searching objects and events by description attributes, e.g. address or name, as well as finding objects by means of interactive indication of a place on the map, measurements of distance and surface area, and finally options of labelling selected places and commenting on facts, and sending applications and comments, which is indispensable in such a civil service. An important aspect of the research will also be the consideration of the basic principles of designing the website's usability. Such a website should be transparent, intuitive, and accessible for any user: for both the citizen and the commune clerk.

Keywords: spatial planning in Poland, social participation, geographic information systems, cartographic visualisation, geoinformation website, e-government.

SELECTED BASIC METEOROLOGICAL ELEMENTS AND THE POSSIBILITY OF THEIR CARTOGRAPHIC REPRESENTATION

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ABSTRACT

The meteorological elements are used for a definition of the instantaneous state of the atmosphere. The basic elements are: air temperature, atmospheric pressure and atmospheric precipitation and air flow. These elements are characterized by certain parameters, which we call climatological characteristics. Each of which shall be monitored either continuously or at regular time intervals, depending on the purpose and type of observational stations. The obtained data were processed statistically. Results of meteorological and climatological measurements and observations can be displayed graphically on meteorological maps. Choice of cartographic interpretation depends on the characteristics of displayed meteorological elements.

Keywords: cartographic representation, meteorological elements, interpolation technique, ArcMap

SETTLING SELECTION PATTERNS IN THE SUBCARPATHIAN AREAS OF ROMANIA. SALT RESOURCES AS A DETERMINING FACTOR FOR PREHISTORIC OCCUPATION

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ABSTRACT

The paper presents a number of methodological aspects, based on GIS (Geographic Information System) applications, useful in complex studies of prehistoric economies, or, more specifically, of subsistence strategies employed by prehistoric agrarian communities. The study provides arguments for the existence of an economic potential in the Subcarpathian areas of Romania, and at the same time focuses on determining, by means of landscape analyses, a model of habitation of the prehistoric settlements from this area. Relying on a series of case studies, the main natural resources available in the area were identified, with a focus on the salt springs, which undoubtedly played a key role and should be considered a decisive factor in selecting the occupation areas. Directly related to this, a detailed characterisation of the terrain, by describing its main morpho-hydrometric characteristics, is provided. For the Subcarpathian area of Romania, the ethnoarchaeological investigations conducted recently as part of two research projects, alongside the archaeological researches performed throughout time, interpreted conjointly in a GIS environment, support the hypotheses regarding the archaeological potential of the area directly conditioned by the presence of salt resources.

Keywords: cartography, GIS, spatial analysis, salt resources, prehistoric sites

SIMPLE METHOD FOR INCORPORATION OF TOPOGRAPHICAL FACTOR INTO GIS-SUPPORTED MULTI-VARIANT RAIL ROUTE SELECTION

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ABSTRACT

Geographic Information Systems are considered and used as a tool supporting designers in the process of linear infrastructure routing. In case of designing a railway or a road the terrain is one of the most important factors to be considered. The appropriate methodology of incorporation of topography-related issues into the analytic process is necessary for practical usefulness of the results. The paper propose simple method designed for this purpose. It uses the trend of terrain profile for minimizing the ruling gradient. It is also aimed at imitating the manual setting out of routes by a designer, tending to minimizing the number of intersections between designed route and contour lines. The results obtained in the test performed for a hypothetical suburban railway routing are presented.

Besides the topography, the factors taken into consideration included other physiographic factors, formal and legal, environmental and economic conditions and criteria, such as legal protection of natural areas, water intakes, monuments, mitigation of the adverse impact of investment on inhabitants and the environment, considering the distribution of the existing road and river network in the area, location of the biggest clusters of population (which the designed railway line would provide service to), preference to geologically "safe" areas of favorable construction properties of the subsoil.

For the purpose of joint consideration of design factors and barriers, the method of weighted linear combination was used, obtaining, at the first stage, the revised map of area suitability of the designed investment project, followed by maps of resistance (friction), accumulated values of resistance (costs) and optimum connections, such as linear structures and corridors. The adopted decision support tool enabled to generate additional variants of solutions, depending on the priority assigned to various groups of factors. The results obtained indicated high flexibility of the GIS tools for resolving the contradictory spatial decisions, requiring the simultaneous consideration of a large number of spatial conditions. The method/methodology proposed fulfilled the goals assumed, taking into account the land relief in the process of location of the linear rail investment.

Keywords: linear infrastructural object routing, geographical information systems, spatial analyses, terrain analysis

SOFTGIS AS TOOL SUPPORTING THE MANAGEMENT OF URBAN GREENERY

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ABSRTACT

Public green areas contribute to a city's image and the strengthening of social bonds. The quality of public greenery is determined by spatial planning policies, the availability of funding and management solutions. The presence of well-kept greenery affects real estate prices and local living standards. Members of the local community can provide urban planners with valuable information by identifying sites that require tree planting, hazardous plants that should be removed for the protection of public safety, by reporting illegal logging practices, incidents that compromise the safety of public green areas, by identifying local demand for new green spaces and proposing ways in which local residents can participate directly and indirectly in greenery campaigns. The attendance rates and the most popular activities in public green areas should be surveyed. The comments, ratings and ideas provided by members of the local community can be very helpful in the process of developing city maps. The above information can also facilitate decision-making and management during the development of functional geographic information systems covering environmentally valuable land.

This article describes selected GIS tools that support the development of urban greenery and assist planners in the process of adapting public green spaces to local needs.

Keywords: geographic information systems, green areas, technical infrastructure, public consultation, the management of the countryside

SOIL AGRICULTURAL MAPS AT A SCALE OF 1:5,000 AS A SOURCE OF DATA FOR SPATIAL PLANNING PROCESS IN POLAND

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ABSTRACT

Soil agricultural maps at a scale of 1:5,000, together with annexes thereto that contain descriptive information, were drafted for the whole area of Poland, mainly in the period from 1966 through 1972. They are a valuable and exact source of data on soil conditions. The said maps were prepared on the basis of the existing soil classification maps, also at a scale of 1:5,000, as well as on the basis of terrain and laboratory research preceded by interpretation of aerial photographs. Soil agricultural contours were produced during fieldwork, which is a significant advantage, as direct observation of environmental conditions, terrain use, relief, land cover or humidity, combined with the knowledge and experience of the experts (soil scientists, classifiers) guarantees credibility and accuracy. Pursuant to the relevant provisions of law soil agricultural maps are digital thematic studies included in the infrastructure for spatial information of the European Union in accordance with the INSPIRE Directive. A database thus created constitutes a good source of data for the purposes of local spatial planning process. The purpose of the research was the analysis of the possibility of using the information derived from soil agricultural maps at a scale of 1:5,000 for the purposes of local spatial planning process. This paper presents the characteristic of the data on soil conditions that are included in the maps. It also briefly describes the local spatial planning process in Poland. On this basis the possibility of using the information and data originating from soil maps in planning documents is discussed. Analysis of data included in soil agricultural maps, particularly the analysis of terrain suitability for development, constitutes an important, or even an indispensable tool for the spatial planning process. It allows to obtain the information required for appropriate space management and to avoid erroneous location decisions. It facilitates environmental protection, mainly by protecting the best quality soils characterised by high crop yield. It also prevents financial losses, e.g. by preventing development of lands of excessive moisture content.

Keywords: lands useful for building, lands designated for development, soil agricultural maps, soil conditions, GiS.

SPATIAL ANALYSES OF OUTGOING DATA OF FIRE BRIGADE RESCUE SERVICE

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ABSTRACT

The aim of the paper is to handle of outgoing data of the Fire brigade Rescue Service in Olomouc (FSO) by spatial analysis to define accessibility zones. The research results in a cartographic synthesis of all analyzed outgoings. The main data sources were the records about outgoings (provided by FRSO), data about road networks, data about functional areas and address points. First, the spatial distribution of all outgoings was mapped and then analysed by network analysis resulting in maps of accessibility areas of the fire brigade station (both with time and distance accessibility), maps of accessibility zones of stations, and a map of comparison between time accessibility and distribution of the fire brigade rescue units. The further analysis explored the number of outgoings in certain types of functional areas. In the end, a cartographic synthesis of the Olomouc city was processed by outgoing frequency, dominant type of outgoings and accessibility area of the FRSO station. Even though the results of the spatial analysis differ from the real situation it should be used by FRSO in their planning, prognosis and evaluation processes. The results of spatial analysis are represented by thematic maps.

Keywords: spatial analysis, fire brigade, accessibility areas, cartographic synthesis.

SPATIAL COMPLEXITY OF TRANSPORT INFRASTRUCTURE IN THE CZECH REPUBLIC

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ABSTRACT

The landscape of the Czech Republic is exceedingly varied. The country consists also river basins and low mountains and belongs to the small and midsize countries in Europe (78,866 km2). Transport of people and cargo is based mainly on roads, rails, air and inland waterways in the Czech Republic. Based on statistical evaluation, the most important type of transport (for both people and cargo) is road transport. The total length of road system in the Czech Republic is more than 55.000 km and is divided onto 5 main categories – motorways, highways, roads of type I, II and III. According to the annual report of Czech Ministry of Transport, yearly performance of road transport is 73.28 bn. passenger km and 66.17 bn. tkm of cargo. The coverage density is one of the densest in Europe. The aim of the presented paper is to show a mathematically based approach how to evaluate the complexity of roads and streets with respect to geographical location of the studied cities. Fractal geometry and statistical evaluation of hypothesis testing were used for this purpose. The paper shows also the general overview of the methodology for complexity evaluation of networks.

Keywords: Fractal Geometry, Lacunarity, Statistical Inferences, Transport Infrastructure, GIS, Geocomputation

STANDARDIZATION OF SPATIAL DATA CONCERNING SPATIAL MANAGEMENT PLANNING IN POLAND

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ABSTRACT

Works on the standardization of data models and incorporation of spatial information concerning spatial management planning into the Infrastructure for Spatial Information are currently conducted in Poland in the scope of the implementation of the INSPIRE Directive. This article presents the concept of standardisation of information concerning spatial management planning included in graphic attachments of planistic documents prepared at the commune level. Lack of standardisation results in difficulties in the incorporation of spatial data concerning spatial management planning into the Infrastructure for Spatial Information. It excludes the efficient application of network services, and makes conducting analyses and monitoring changes in spatial management difficult.

The basic assumption of the concept is to enable the transformation of collected information at the semantic level to the form coherent with the INSPIRE specification for spatial management planning (PLU). The standardisation considers the assumptions developed on request of the authority in charge of spatial management in 2013 in the scope of the *catalogue of planistic objects*.

The standard data model is presented in the form of a UML application scheme developed according to the recommended conceptual modelling methodology. The application scheme is integrated with ISO standards of series 19100, and harmonised with the application scheme's developed in the Head Office of Land Surveying and Cartography, i.e. the leading authority in the scope of spatial references and topographic databases and databases with the highest specificity, such as: the spatial register of utility infrastructure, or land and property register.

Keywords: spatial management planning in Poland, standardisation, UML application scheme, INSPIRE, planistic objects.

STATISTICAL STUDY ON THE ACCURACY OF DETERMINING POINTS COORDINATES IN MOUNTAIN FORESTS FROM BRAN-BRASOV, ROMANIA

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ABSTRACT

The paper presents the results of a statistical study on the analysis of various factors that influence accuracy of determining the coordinates of the points in the forests from Bran-Brasov, Romania, using GNSS technology. We have determined the coordinates of 2704 points using the direct measurements method via two GPS receivers (Trimble PRO XH and Trimble PRO XT). We have performed the GIS project of the study area using AutoCAD Map 3D and ArcGIS 9.3 software and the previously determined data. To complete the database we have used information taken from the Forest Division Bucegi - Piatra Craiului. Then, we have used the data stratification method, taking into account the following criteria: forest, border, forest road, and forest at the altitudinal limit – open wood, alpine barren zone. These data stratified in 5 categories were processed using the Statistics 8.0 software and, in this way, we have shown the most favorable conditions and the most critical situations.

Keywords: accuracy, statistical analysis, GIS, GNSS, forest

STUDENTS TELL THEIR STORY BY WEB MAPS – EDUCATIONAL CASE STUDY

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ABSTRACT

The research which took place at Department of Geoinformatics, Palacký University in Olomouc has been focused on student´s map application project. An innovative way how to create interactive web map application called "Storytelling Maps" has been used. Storytelling Maps is a lightweight platform, developed by Esri Company for creating, customizing and sharing own web maps through the Internet. The main benefit is fact, that there are number of pre-built high quality templates. Users can combines their map content with Storytelling template including interactive map, photos and images, text panel etc. Generally, the output application combines spatial data with attribute data accompanied by photos. This approach offers a better image of described topic than conventional maps only. The Storytelling platform takes advantage of open-source approach. It means that every single map application could be customized according to users´ individual requirements.

The case study has been made on six groups of student in bachelor degree. Each group tells another story – each group developed an individual application according to different topics (leisure time, travelling, sport, etc.). The development process was divided into two parts. First of all, data collection process was necessary. Students collected real data in the fields. They captured photos, geographic and appropriate attribute data. Then data was transformed into a Geographical Information System (GIS). The second part handles wit Storytelling Maps platform. Spatial data was visualized and connected with other information and photos. The crucial step was to choose an appropriate template. The last step was customizing and extension of templates according to cartographic purposes.

From academic point of view this case study is an innovative approach that combines last GIS technologies with self-managing process. Students are checked by academics during whole process by feedbacks. On the other hand students are fully responsible for each part of application. They increased their knowledge in technical, cartographical as well as managerial capabilities. Finally the project have been evaluated from academics at the Department of Geoinformatics based on some factors: idea, customization, functionality, cartographic correctness. The results shows that "Storytelling Maps" platform could be right tool for interdisciplinary education.

Keywords: Storytelling Maps, web map, template, education

STUDY OF LANDSCAPE OF THE THIRTY YEARS' WAR PERIOD IN MORAVIA USING INFORMATION RECORDED IN HISTORICAL ENGRAVINGS

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ABSTRACT

A valuable source for the study of the Thirty Years' War is represented by documentary engravings that appeared in spectacular historical publications of that time. The paper focuses on the possibility of researching the landscape and its development using these engravings, particularly in the area of today's Moravia, which was often a place of the passing, camping or encounter of individual armies.

The important places, which were worth capturing by former military engineers, comprise the Moravian cities of Brno, Olomouc and Opava and a camp in Horní Moštěnice near Přerov. Valuable sources of information on extinct historical reality, beside the wartime events themselves, are also the scenes with important military contents – such as besieged towns, systems of field fortifications and whole cut-outs across landscape, both real and fictional.

Compared with other cartographic sources of that time or younger ones, the engravings manage to identify individual facts recorded and, in conjunction with a digital terrain model, not only the captured military situation, but also the surrounding landscape as a whole, may be clearly visualized. The interpretation of the plans of military engineers has not been made entirely clear yet. The research suggests that, in some cases, they could be a kind of strategic plans or documentation of an ideal course of combat operations. However, the complex description of reality in these documentary works has much to say even today.

Keywords: landscape, engraving, cartographic analysis, GIS, historical battlefield, Thirty Years' War

TECHNOLOGY OF PROCESSING OF ENORMOUS AMOUNTS OF GEOGRAPHICAL DATA

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ABSTRACT

The article describes the technology of data analysis of the storage of underground utilities under certain types of terrain surfaces on extensive territories. This analysis was done in order to determine reproductive values of these utilities and the valuation of costs which would be necessary to spend for building new utilities. The process of data analysis that is based on the classification uses raster datasets of orthophoto, vector datasets of Fundamental Base of Geographic Data (ZABAGED) and vector datasets of the route of line of underground engineering networks. The aim is the mining of the maximum information from the raster image of orthophoto and its transfer to the database and vector form. The advantage of technology is a high degree of automation of the whole process and the efficiency of use especially in large areas. The technology was tested in the project of data analysis of storage of gas facilities under certain types of terrain surface in the Czech Republic (CR). The authors solved this project for the GasNet, Ltd. Company which is a part of a RWE group in the Czech Republic. Input data were datasets of orthophoto with a resolution of 25 cm/pixel, layers of communications of ZABAGED CR and vector sets of the route of line of underground engineering networks. Due to the territorial coverage of the CR with the area of 64,350 km^2, these were massive tasks with total data volume of 500 GB. The data analysis was carried out in the assigned created application in Python language with support for ESRI libraries and also in ArcGIS 10.0 environment. The results demonstrated the high efficiency of the technology and the low error rate in the range of 2% - 3% was achieved over the whole modeled area.

Keywords: image classification, spatial analysis, GIS,

THE 3D MODEL OF THE SMALL FORTRESS OF THE TEREZIN MEMORIAL

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ABSTRACT

The paper gives an overview about the concept of the Terezin Memorial model and the proposed technical solution with focus on the 3D model of the Small Fortress. Back in June 1940 the Small Fortress in Terezin was turned into the Prague Gestapo Police Prison where mostly political prisoners were incarcerated. Thousands of members of different groups of the anti-Nazi resistance movements from the occupied Czech lands as well as inmates from many other countries passed through the prison. For modelling the buildings most ground plans and facade plans were used. For modelling the roofs and interiors the plans (profiles) of buildings were used. All these materials are available for fortification as well as for individual buildings. If necessary, also the maps and plans of (e.g. Austrian State Archive) and (e.g. State Regional Archive in Litoměřice) were used for modelling the buildings. Due to a huge amount of spatial data it has been decided to use a concept of Level of Detail (LOD) based on LOD in CityGML standard. The principle consists of division of objects into successive component parts. They share the shape of the footprint and the height of the building. It also enables an analysis and visualization of the same object depending on different desired LOD.

Keywords: Shoah, digital 3D model, level of detail

THE ANALYSIS OF THE UPDATING TIME OF SUBJECT AND OBJECT DATA DUE TO THE INFORMATION FLOW BETWEEN THE SYSTEMS OF THE REAL ESTATE CADASTRE AND THE LAND AND MORTGAGE REGISTER

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ABSTRACT

This article presents the connections between the real estate cadastre (REC) and land and mortgage register (LMR) in terms of the time of passing geographic and legal information between these systems. The studies were carried out in the units responsible for the Inventory of Land and Buildings (ILB) and courts keeping the land and mortgage register in 2002 and in 2012.

The results of the studies on the information flow from LMR do REC in 2002 revealed significant inaccuracies. Many cases of outdated information were found in ILB. After introducing legal changes in LMR and sending the message about this fact to the register, the time of introducing the information into the system, in some cases, exceeded even 1200 days. Based on the same studies, it was also observed that some courts responsible for land and mortgage register did not update the content of the register, despite the fact that ILB informed them on the changes.

The studies carried out in 2012 were to define the present situation with the time of the exchange of object and subject data between the mentioned systems. A subsequent analysis of the time of updating information to verify to which extent legal as well as technological and informatic changes of the recent decade improved the co-operation between REC and LMR systems. Based on these studies one can also state that in the offices in Poland the information flow is still irregular. There are still problems with the updating the data revealed in the real estate cadastre and the land and mortgage register.

While the recent progress in technology and informatics facilitated the access to information both in the real estate cadastre and in the land and mortgage register, nowadays also in an electronic form, it did not provide automatic integration of data between the systems nor prevented the data redundancy. Only the creation of the Integrated Real Estate Information System (IREIS) would provide the on-line updating of the data change in both systems. The basic goal of IREIS would be providing the access to reliable and up-to-date information on the real estate, collected in public registers.

Keywords: real estate cadastre (REC), land and mortgage register (LMR), Integrated Real Estate Information System (IREIS)

THE APPLICATION OF GEOINFORMATION IN THE PROCESS OF DETERMINING SIGNIFICANCE OF REAL ESTATE ATTRIBUTES

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ABSTRACT

Presented paper introduces the methodology of significance of real estate attributes research on the decision making problem related to selection of an optimal function of the area with using GIS. To asses the significance of respective real estate attributes, foundation of rough set theory in connection with value tolerance relation based on the fuzzy logic was used and the data obtained in the analysis of geoinformation.

Applicated method based on rough set theory and fuzzy logic to the estimation infulence validness of the real estate attributes on the choice of the suitable function of land utilization, it can determine the valuable alternative for statistical analyses which is generally used in research of property market. On the basis of an elaborated model and information obtained through the analysis of geoinformation, we can describe mutual relations between areas (functions) of a city via elements which form it, placed in a given space. The application of geoinformation in evaluation of significance of real estate attributes, as well as the analysis of mutual relations and dependencies between areas of different purpose and potential, can prove a very useful tool for land planning and land management.

Keywords: geoinformation, attributes influence on real estates functions, rough set theory.

THE EDUCATIONAL DATABASE OF CARTOGRAPHIC SYMBOLS FOR LARGE-SCALE MAPS

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ABSTRACT

Usage of cartographic symbols on mapping outputs of students in the Czech republic is currently based on information and lists of symbols, which they acquire from legislations. The appropriate legislations are especially The Czech national standard 01 3411 (Large-scale maps. Drawing and symbols.) and The Announcement about Cadastre of Real Estates, as amended. Unfortunately these legislations do not contain complete procedures for real objects surveying or cartographic symbols location on the map.

Problematic are also missing solutions of complicated situations and out-of-date legislations. For example Czech national standard 01 3411 has been valid without changes since 1989. During the mapping we can encounter complicated situations, for which do not exist uniform rules for mapping and drawing into the map, for example big billboard or more lights on one pole. In not updated standards lack symbols for objects, that did not occur in real world at the time of their publication, for example the parking payment machine.

Therefore, creating the database should help students with their mapping outputs in both, surveying and visualization the real object in the final map. Its main content should consist of list of symbols, their visualization with proportions, photos of real object, procedures of surveying and cartographic symbols location into the map and other necessary information for student´s outputs.

Keywords: cartographic symbol, database, large-scale maps, procedure

THE GIS TOOLS IN THE PROCESS OF FLOOD THREAT EVALUATION

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ABSTRACT

The flood damage recovery usually requires a considerable amount of money. The main objective of this paper is to provide an overview on the possibilities of using GIS systems even during the phase of the evaluation of floods as a thread. The high quality input data allowing the use of comprehensive analytic capabilities of GIS systems is thought to be the main prerequisite for an effective use of these systems in the field of practice. The results of the analysis are a valuable source of information even for logistical planning in order to handle the flood crisis and to minimize caused damage.

Keywords: flood, modeling, risk, map of the flood hazard and flood risk map, geographic information systems

THE INFLUENCE OF THE DISTRIBUTION OF GROUND CONTROL POINTS ON GEOREFERENCING

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ABSTRACT

The article presents information about one of the problematic aspects of georeferencing old maps, which is the layout of grounds control points. The transfer issue of old paper maps into a digital form and publishing them on the internet is still a hot topic, involving a number of professional cartographic companies, universities and government institutions. Old maps are a phenomenon for both the professional community and the general public. Old maps are currently being published as web services, and the user can compare the evolution of landscape in different historical periods. The most important act of publishing old maps on the internet is the georeferencing of scanned maps. Most cartographers georeference without giving adequate attention to choosing the appropriate distribution of grounds control points and without selecting the appropriate map projection.

The article deals with the possibility of determining whether grounds control points are appropriately distributed across the map drawing. Old maps very often have a local distortion (shrinkage of paper, connection of individual drawings, etc.), therefore, the article describes the creation of a source code in MATLAB, which should draw attention to inappropriately located ground control points. It is important that the number of grounds control points in each section of a map is approximately the same. Another important indication is that the grounds control points are not too densely placed (e.g. choice of ground control points at one building, etc.), or the grounds control point are not too far from each other.

Keywords: Georeferencing, ground control point, transformation

THE MAP OF AVERAGE LAND TRANSACTION PRICES - A NEW POLISH CARTOGRAPHIC PRODUCT

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ABSTRACT

The map of average land transaction prices constitutes a new cartographic elaboration that is to be drawn up for the whole Poland. It has been defined in the Regulation of the Council of Ministers from October 3rd 2011 on the types of cartographic thematic and special products. According to the regulation the digital map of average land transaction prices should represent variations in average transaction prices of building and agricultural lands for the entire country in relation to the basic, three-level administrative division of the country.
The paper brings closer to the idea of a map of average land transaction prices concept mentioned in the Regulation from 2011. Moreover, the authors propose the concept of the map of average transaction prices corresponding to the 1:1000 000 detail levels for the Mazowieckie Voivodship area covering, among others, the city of Warsaw itself. In the first stage the statistical data collected for the purpose of the map elaboration have been characterized and analyzed. The result of that step was statistical indicators calculated for particular counties, which can be shown on the map having been developed. In the next stage the map concept and its design principles are introduced. With the usage of selected cartographic presentation methods the example maps were prepared. Methods and forms of cartographic presentation were chosen regarding the character of the presented phenomena, as well as a reference type of the spatial data used.

Keywords: map of transaction prices, average land transaction prices, cartographic presentation methods.

THE USE OF EYE-TRACKING FOR THE EVALUATION OF VARIOUS CARTOGRAPHIC TASKS

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ABSTRACT

To express spatial information there are lots of methods of cartographic visualization. Using these various methods differ primarily in connection with the main purpose and objective of visualizations. To select appropriate methods of cartographic visualization and appropriate parameters of each method, it is necessary to perform user testing through the use of various cartographic tasks. Statistical evaluation of correctness and time performance of these cartographic tasks subsequently lead to the evaluation of each parameter of particular methods of cartographic visualization.

When dealing with the cartographic tasks it is needed to define all aspects related to cartographic processing in a particular case. To evaluate the individual aspects of cartographic tasks it is possible to use a modern technological approach in the form of eye-tracking.

The paper describes the use of eye-tracking technology in solving various cartographic tasks. It is a combination of outputs of a comprehensive set of eye-tracking experiments that address different areas of cartographic visualization with focus on the non-technological aspects. All the evaluated aspects are related to the efficiency of information transfer from the map to the user, which is presented as the information perception.

Individual experiments are focused on specific aspects of cartographic visualization - the use of text labels and fonts, use of colours, the map content (information vs. graphic), various methods of cartographic visualization, etc. The resulting comparison enables comprehensive view of the issue. The uniqueness of the study lies in the assembly and comparison of multiple experiments, not from the perspective of the individual research questions, but in the form of evaluation of different cartographic tasks solved by individual respondents.

Keywords: methods of cartographic visualization, eye-tracking, cartographic tasks

THE USE OF GIS IN THE STUDY OF BUS LINES
THE CASE OF LISBON AND OPORTO METROPOLITAN AREAS

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ABSTRACT

The passenger's transport system plays a vital role in providing all citizens and visitors the access to a set of locations and facilities. Thus, in Portugal, one of the most important ways of public transport it's the bus. It is crucial to have a more detailed knowledge of the bus transport system, in order to have better services. It's common sense that bus routes tend to cluster in urban areas, but many times it is difficult to identify precisely which zone has a higher or lower concentration of bus lines.

The identification of bus lines concentration areas may serve as support to planners and decision makers to a more informed management and planning of the bus transportation systems. In this sense the focus of this article is to develop a Geographic Information System (GIS) based methodology in order to identify and rank bus lines concentration areas. The working is illustrated using 2013 SIGGESC (*Sistema de Informação Geográfica de Gestão de Carreiras*) bus lines database, for the metropolitan areas of Lisbon and Oporto. SIGGESC is a spatial decision support system (SDSS), based on a GIS, directed towards the public transportation sector. This SDSS contributes to a paradigm shift at the Portuguese Transportation Authority (IMT) in terms of the process of registering and granting concessions to the bus companies, and also increases IMT's ability in other supervision tasks. It allows a better coordination and planning of bus lines, and contributes to the dematerialization of the licensing processes.

Keywords: Geographic Information Systems for Transportation (GIS-T), Spatial Decision Support Systems (SDSS), Public Transportation, Transportation Planning, Metropolitan Areas.

THE USE OF GIS TOOLS IN THE ASSESSMENT AND CLASSIFICATION OF URBAN SPACE USEFUL ELEMENTS

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ABSTRACT

Urbanized space is a collection of different elements that complement. These elements serve man and give him a certain standard of living. Urbanized space is also a subject to continuous and dynamic process of transformation, which provides adaptation to the needs of the human space. Spatial planning, which is a tool of adapting, is based largely on the decision making process. This process is not effective unless it is based on the recognition and quality feature of the space. A special element of the urban space is a network of pedestrian communication. This is part of a typical usability, which also determines the perception of urban space.

The aim of this paper is a summary of research on the assessment of this element in use of urban space. To develop rules for the assessment of the pedestrian communication on the selected area of the city of Olsztyn, methods of measuring the quality of utility objects was used. As mentioned, the basis for the creation of pedestrian communication is its usability. Based on this fact, to assess the urban space qualimetric methods were used. These methods are based on qualitology. In the process of calculation and presentation of the research results GIS tools were used. This element of research became the basis of the present paper.

The results represent the image quality of the pedestrian communication in urbanized space. The procedure can become the basis for audit conducted on a large scale.

Keywords: GIS-visualization, pedestrian communication, qualitology, urban space.

THEMATIC ACCURACY AND COMPLETENESS ASSESSMENT OF SPATIAL DATASETS

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ABSTRACT

The paper aims to present the main issues related to the thematic accuracy and completeness assessment for a spatial database. The accuracy evaluation has based on the data quality elements and subelements, according with ISO 19113 Geographic Information-Quality principles and ISO 19114 Geographic Information-Quality evaluation procedures. There was identified an interaction between the omission (polygon is missing), temporal accuracy (changes in land use, re-allot) and classification correctness (errors in interpretation). The classification correctness as a subelement of thematic accuracy was checked by using the *error matrix.* When data quality elements and subelements are interacting and overlapping, there will be some difficulties and limitations in the evaluation of the data quality and consequently and the results of data quality measure will be influenced.

Keywords: thematic accuracy, error matrix, completeness, GIS, ISO

TOURISTIC CAPITALIZATION OF THE GEOMORPHIC KARSTS IN THE HAGHIMAS MOUNTAINS

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ABSTRACT

The Haghimas Mountains are located in the Transylvanian-Moldavian group of the Romanian Carpathians. The geomorphological structure is formed over the crystalline rocks upon which mainly sedimentary limestones, conglomerates and dolomites were deposited. The suspended relief of the Haghimas trough shows a well-developed endokarst geosystem to a lower extent due to recent hydrographic conditions and sediment clogging of waterproof materials. Because of the strong tectonization of the northeastern edge of the trough we can study important caves and potholes in the geographic area of the Haghimas as well as gorges that were formed in a tectonic, erosive, and corrosive way together with the interaction of these phenomena. [1,3] Extreme forms of tourism that can be practised here are caving (exploratory research), canyoning and climbing.

Our study focuses on the following geomorphic karsts: Sec Stream, the Great Gorges (Bicaz Gorge) Bicajel Gorges with its affluent The Alb Stream, Lapos Gorge, Sugau Gorge, Licas pothole, Pistabacii pothole, Munticelu Cave, and Gura Bardosului Cave.

Our study aims to monitor routes and to map the main tourist resources in the studied category.

Keywords: limestone potholes, canyoning, caving, climbing, geotourism

TOWARDS A USER CENTERED DESING FOR THE CZECH AIR FORCE

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ABSTRACT

This paper is the result of a project that examines the potential of web mapping services for military pilots. Military pilots (and perhaps pilots more generally) are special users who can benefit from dynamic mapping. The authors´ research is of a user and user centered design of web mapping services. While Geographic Information Systems (GIS) represent a step forward in cartography, users and user issues become increasingly important when such systems are dynamic and/or deployed in a setting where time and space are constrained. We focus here on identifying the limit at which the value-added of online and dynamic mapping exceeds to costs in time and attention. Several methods related to users and usability problems are applied. The goal is to identify the most appropriate function for web mapping service for the Czech pilots, which are the target users. The pilots of the Czech Air Force (CZAF) are already familiar with digital maps. In this paper, two techniques employed for understanding the needs of the target group are employed: the first method is quantitative research on 64 CZAF pilots and their map use; after evaluating these results, the qualitative research followed.

Keywords: web map services, user centered design, user requirements, digital maps, pilots.

TRAVEL TIME MAP - THE CASE STUDY OF WARSAW SUBWAY

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ABSTRACT

The paper presents the time accessibility analysis of the second line of Warsaw subway, which is still under construction. To designate time accessibility anywhere in the city the Inverse Distance Weighted interpolation method was used. In the previous authors research this method was considered the most appropriate interpolation of such kind of data. The estimated travel time is presented in the form of isochron map, which shows how long it takes to travel between a particular place and the nearest subway station, using public transport. For more than 50% of Warsaw territory this travel time does not exceed 30 minutes with the mean absolute error not greater than 2 minutes.

Keywords: accessibility map, travel time map, IDW method, isochrones, public transport

URBAN PLACES AND SPACES FROM POINT OF VIEW OF THE THREE DIFFERENT METHODS USING OLD MAPS AND PLANS (ON THE EXAMPLE OF THE URBAN SPACE IN THE LIBEREC TOWN)

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ABSTRACT

The method of the present study is to discuss, improve and apply methods from cartography on the basis of old maps and plans while using approaches of geography and history for the analysis of the selected place in spatial and temporal contexts. Old maps and plans of Liberec are thus a source of information for the characterisation of the state and spatial changes of the defined urban space in time. Result of the work is the implementation of case studies on the geographical concept of place in a particular topographical situation of the chosen urban space in Liberec. Lists of maps were made; historical and archive sources were taken into account, the methodology of using old maps and plans was discussed. These, along with inventory research, are the values which were added to by the work of the greater involvement of geoinformation technologies, especially for spatial, network and other analyses, including the use of remote sensing images. Graphic visualisation of data using GIS tools is also important. Old maps and plans (in our case maps and plans of Liberec) are integrating bearers of information about the area being studied, which becomes a place or group of places in the analysis conducted. Maps and plans of scales larger than 1:200 000 are classified as topographic maps (descriptions of places). Topography is their explicit attribute. Another important attribute of old maps and plans is their ability to conserve the reality of specific places in time. By adding the study of archive and historical sources, it is possible to outline a concept of interdisciplinary approach to the geography of place in spatial and temporal contexts. The concept of the work can be divided into four thematic areas:

- old maps and plans in the interdisciplinary geographic research of urban places described using old maps (to create a chronological line of the locations and to compare map symbols of the locations: graphical depiction, position, general comparison in time, street networks,...) confronted and supplemented with information from historical materials and historical studies
- GIS analysis (to rectify maps, to georeference maps, vectorization, network analysis, area quantitative analysis of surface structures using geometry, topology …)
- deeper specification of the method (comparison and complementarity of three research approaches – reading maps, use of secondary historical source, GIS analyses) through the case study
- evaluation of the results obtained using different methods.

Keywords: old maps and plans, reading maps, urban space, place, network analysis, GIS, secondary historical sources

USE OF GIS FOR THE ASSESSMENT OF LANDSCAPE STRUCTURE AND SETTLEMENTS DEVELOPMENT IN THE VERNERICKE STREDOHORI MTS.

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ABSTRACT

This paper focuses on the development of settlement and landscape structures in area of Vernericko lying in the protected area Ceske stredohori. On the basis of comparison of historical cartographic materials and the current state landscape development was researched by application of spatial analysis and statistic assessments. Data were prepared and then analysed in software ArcGIS Desktop 10.1. For landscape development of whole model area, grid method of 200 m (respectively 500 m) size was used. The development of settlement and identification of extinct villages were evaluated in the period of 1843 - 1952 - 2012. A total of 36 settlements were monitored. A detailed analysis of landscape structure changes were performed only in selected municipalities. For detailed analysis of settlements, data were digitized. Results are specification of defunct settlements in the Vernericko area, assessment of the landscape structure development in their surroundings and in the region overall in the context of historical and contemporary trends of landscape change. Discovered tendencies refer to considerable change of landscape use in the extensive direction which was enhanced by the expulsion of the Sudeten Germans after the Second World War connected with spontaneous dysfunction of settlements. Valuable landscape structures of the area are threatened by currently ongoing tendencies of landscape change associated with the absence of a human – farmer.

Keywords: Vernericke stredohori Mts., GIS, landscape structure, landscape analysis, settlement structure, defunct settlements, Sudetenland

USE OF GNSS IN AVIATION

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ABSTRACT

The article "Use of GNSS in aviation" describes procedures for calculating instrument approach with using GNSS equipment to airports in Slovakia. This article focuses mainly on finding the most dangerous obstacles in approach phase and calculating safe altitude above obstacles. In conclusion article describes usability evaluation of GPS in the approach area and its benefits for the practice.

Keywords: GNSS, navigation, RNAV, instrument flying procedures

USE OF SATELLITE DATA IN MONITORING ECOLOGICAL CONDITION OF URBAN LANDSCAPE

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ABSTRACT

Space monitoring of urban areas is based on research which uses satellite data, spatial-temporal changes of landscape and functional structure of the city and in selected indicators of the environment that are influenced by urbanization.

In this paper on example of certain areas of the Kyiv metropolitan area the application of methodological issues are considered in the analysis of cosmic material changes in the landscape and the functional structure of Kyiv are associated with intense development in the valley of the Dnieper river and within the historical part.

The analysis was carried out in two ways: 1) analysis of changes in the landscape and the functional structure of the city according to multispectral space imagery; 2) analysis of the distribution of surface temperatures in the historic part of the city by outer thermal scanner range

The basis of the research methodology laid in our Centre processing technology space materials based on the use of so-called spectral indices and image classification with previous studies and the calculation of the underlying surface temperature according to the thermal range (10.40-12.5 microns) Landsat TM, ETM with an estimation the coefficient of a thermal radiation on normalized vegetation index (NDVI). Analysis of calculation results of temperature fields and mapping was performed using GIS.

The obtained data indicates that the use of satellite data in monitoring urban landscapes can quickly track the changes of landscape and the functional structure of urban areas, identify dangerous trends in their development and monitor violations of environmental laws that can result in optimal management decisions in environmental and urban planning.

Monitoring of the thermal field within the historical part of Kyiv shows that a decrease of natural land cover and sealing with urban areas increased surface heating in that area. As local microclimatic conditions, this can cause violation within protected areas and promote climate change at the regional level. The latest refers to the growth of the "urban heat island" problem, which is given very close attention in almost all developed countries.

Thus, protection of vegetation and increasing its range in the historical part of Kyiv is in a priority to preserve ancient architectural ensembles. In addition, in our opinion, it is necessary to introduce the European countries experience for the construction buildings with "green roofs" that reduce the negative impact of high temperature in an urban environment in summer and reduce heat and energy losses in the winter

Keywords: remote sensing, monitoring, urban heat islands

VISUALIZATION OF FUZZY SURFACES WITH AN EMPHASIS ON USER ASPECTS

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ABSTRACT

When processing spatial information it is very important to maintain the maximum possible accuracy of positional and attribute characteristics. The level of accuracy is determined by the required details in the digital model processing or in the resulting cartographic visualization. Inaccurate information perceived from digital cartographic representation may not be caused due to incorrect way of interpreting, but are often already caused by some inaccuracy in the data collection (e.g. precision measurements of position) and their subsequent processing (e.g. different ways of data interpolation). When such processed information represents a basis for decision-making processes, the quality of subsequent decisions is determined by the quality and accuracy of user information perception. In many areas of decision making there are used geovisualisations (cartographic visualizations), which are interpreted by experts on various topics, not only by cartographers or data specialist. Such cases include, for example, administration, crisis management and many other fields of human activity.

In surfaces visualizations there are usually used the standard expression cartographic methods, such as contour lines, a method of colour hypsometry or pseudo-3D previews. The visualized surface is mostly presented as precise and standard representation do not present any vagueness, so the user does not know the accuracy in which information can be count and whether this degree of inaccuracy is constant or variable in the study area. The solution of this disadvantageous situation is the visualization of fuzzy surfaces, which includes not only information about the altitude, but also the uncertainty.

The paper describes the visualization of fuzzy data in order to make the most efficient transfer of information from the map to the user. There are presented the results of research focused on the user aspects of fuzzy visualization of surfaces using the latest approaches in the cartography.

Keywords: fuzzy surface, cartographic visualization, user issues