

V. Geographic Information Systems (GIS)

1. **Gilda Gavrilas, Loredana Crenganis: *The use of Geographic Information Systems (GIS) in upgrading water distribution and sewerage systems***

The creation and use of spatial database for the management of water/sewer public utilities according to the standards of European Community represent today an important instrument for a better and more efficient quantitative and qualitative exploitation. Starting from this aspect, the paper presents the stages in achieving the spatial database within a GIS application and an example of conversion specific data on computer, of obtaining a relational database, as well as the modality in which the connection between the spatial data and the descriptive ones is performed within the model. Once such connections established, the information can be used in different analysis and optimization modalities within water/sewage systems. The large volume of graphic information that can be purchased today require its use simultaneously with the necessity of ensuring centralized data control in the database management system.

2. **Gilda Gavrilas, Loredana Crenganis: *Aspects regarding the modeling of water distribution networks using Geographical Information Systems (GIS) and the EPAET program***

Upgrading water distribution systems in towns imposes the study of water distribution networks, starting from a global vision including the current situation, the management of each element of the system as well as their exploitation, development and optimization. The water distribution system consists of a number of interconnected hydraulic elements, each of them characterized by certain relations among the variables that have been chosen to describe their functioning. Currently, the GIS system has the advantage of enabling the collecting and validation of all available information, leading to the possibility of a coherent data set for the elaboration of a hydraulic model. The paper presents various possibilities to analyze the functioning of a water distribution system.

3. **Cornel Cristian Teresneu, Gabriela Biali: *Possibilities of estimating discharge in small watersheds by means of GIS***

The paper firstly outlines the model types that can be used for producing the stream discharge hydrograph, specifying for each model its application field. Once created the digital terrain model of the studied area (Valea Portii watershed, Brasov county), the model was used to delineate hydrographic sub-basins, to determine terrain slopes, to produce the unit hydrograph, identifying the primary and secondary flow tracks and the drainage area. All these data were aggregated with the necessary hydrological data and, in the end, the discharge for the whole watershed was determined.

4. Cosmin Constantin Musat, Floarea-Maria Brebu, Alina Corina Bala, Ioan Sorin Herban: Resources development digital geospatial data using the digital topographic plan of Romania-TOPRO5

Reference topographic plan of Romania, in digital format, corresponding to scale 1: 5.000 (TOPRO5) is the unique cartographic support to integration geospatial data for the realization the National Spatial Information Infrastructure - INIS. INIS Geoportal provides the following functionality: publishing service of metadata; view services and search services as well as data downloading necessary for each user. The application is designed to facilitate of exchange geospatial data resources of a large community of users, providing the tools for search and discovery of spatial data sets and Web services within INSPIRE geoportal of Romania.

5. Ioana-Delia Miftode, Gheorghe Romanescu: GIS implementations for uz hidrografic basin flood risk analysis

The paper focuses on processes and hydroclimatic risk phenomena through diagnosis and forecast necessary for natural risks prevention plans and for containing human and economic losses. The objectives have national and European level priority. The higher occurrence for the frequency of natural hazards and for environment vulnerability coupled with the risk to which the population is exposed, form a solid reason for this study. The chosen test zone is Darmanesti depression for which the hazard, vulnerability and risk maps were made using GIS, while quantitatively evaluating the caused damages.

6. Alexandra Sandu: Spatial disparities in the distribution of green urban spaces in the post-socialist cities; a GIS approach. Case study: Romania

The delineation of stream networks and catchment areas is one the most common applications of Digital Elevation Models (DEMs). In this article, an innovative reversed approach for the approximation of DEMs from stream networks is presented. As a fundamental pre-processing step, the stream networks are sampled with a set of points.

7. Isabela Balan, Loredana Crenganis, Flaviana Corduneanu: Flood analysis using Mike 11 by DHI and ARCGIS. Case study - the flood in the upper catchment of river Geru, Galati county, Romania

Between the 11th and 13th of September 2013 large quantities of rainfall occurred in the upper catchment of river Geru. The precipitations have generated a flash flood with three peaks, with the maximum discharges of 118.00 m³/s recorded on 12th of September 2013, 23⁰⁰. Simulations of the flash flood were performed alternatively with Mike 11 by DHI - NAM (Nedbør Afstrømning Modele) and with MIKE by DHI -UHM, using radar precipitations as input data. Radar rainfall values were generated by ROFFG (Romanian Flash Flood Guidance) software system in ArcGIS module for determining the area affected by flash floods.

The program Mike 11 by DHI - NAM accounts for the water content in up to 4 different storages. As default, NAM uses 9 parameters to represent the Surface zone, Root zone and the Ground water storages. The program Mike 11 by DHI - UHM calculates excess rainfall and determines infiltration losses by four methods. The discharge hydrographs

simulated with Mike 11 by DHI program were compared to the discharge measured at the hydrometric station. The amplitude and phase errors are directly dependent of the accuracy of the input data and chosen parameters.

8. Pavel Sebastian Apostol, Constantin Bofu, Mircea Afrasinei: Zonal study for the optimum placement of an pumped-storage hydroelectric superior reservoir

Pumped-storage hydroelectricity is a type of hydroelectric energy storage used by electric power systems for load balancing. The method stores energy in the form of gravitational potential energy of water, pumped from a lower elevation reservoir to a higher elevation in an superior reservoir. This paper presents a theoretical and practical solution on the above theme. The superior reservoir location needs to meet a series of terms listed by the general designer. On the strength of the huge study area, the amount of the involved information, the task of merging the textual and spatial data and the way these above mix all together, the optimum way is to use the geographic information system (GIS) methods.

9. Gabriela Droj, Laurentiu Droj: GIS based automated valuation models; a genuine solution for real estate valuation in Romania

In the latest period, the usage of statistical models in the valuation of real estate properties became very popular among appraisal specialists, bankers and researchers from this field. Many Automatic Valuation Models (AVM) using different statistical and mathematical models like regression, neural networks, and fuzzy logic were proposed and developed with the purpose of assessing the value of a property. Also Computer-Assisted Mass Appraisal (CAMA) became popular for mass valuation of the real estate in fields like taxation or banking sector. The main weakness of an AVM and a CAMA is the absence of the locational analysis of the real estate; even if the spatial component is a main characteristic in establishing the commercial value of a certain property. Geographical Information Systems may be used in order to improve the accuracy of the Automated Valuation Model (AVM) or Computer-Assisted Mass Appraisal (CAMA) by combining the statistical evaluation methods with the spatial locations on property value. The cadastral maps as part of a geographical information system are essential to correct the mathematical models used in Computer Assisted Mass Appraisal. In this article, we analyze the applicability of geographical information system in property assessment, evaluating if the GIS automated models can be a solution for real estate valuation using a case study from the city of Oradea, Romania.

10. Constantin Bofu, Loredana Crenganis, Horatiu Hogas, Costel Boariu, Bogdan Mandache: The use of GIS technology in monitoring of antisocial events

This paper intends to analyze antisocial and criminal events in Iasi municipality assesses and finding potential factors that generate this phenomenon. This assessment was necessary to build databases of antisocial events; each event is recorded with all its significant data. For this work was needed antisocial collection events were classified into several types of offenses using online media.

11. Ana-Cornelia Badea, Gheorghe Badea: *Considerations on open source GIS software vs. proprietary GIS software*

Open source software is that kind of software that can be freely used, changed, and shared (in modified or unmodified form) by anyone. Generally, the open source software is made by many people, and distributed under licenses that comply with the Open Source Definition. There are currently several open source GIS software solutions that imposed themselves and gained ground against proprietary GIS branded solutions. The purpose of the present article is to highlight the characteristics of these freeware GIS solutions and some advantages of using them. Also it shows how are implemented these concepts in MSc. curricula.

12. Iustina Lates, Loredana Crenganis, Mihail Luca: *3D modeling in GIS application and earthquake risk assessment of the buildings*

The issue of 3D modeling is very important nowadays and used in a wide range of domains from video games to general cadastre. In the last years the number of software that can create 3D modeling projects had increased and developed depending on the user needs. The programs used in this paper were Google Sketchup, Autodesk Autocad and ArcMap. The 3D model is accessible for all the users and represents an easy and interactive way to visualize dates and details about buildings. In this paper we created a 3D model of an urban area located on Splai Bahlui Mal Drept street of Iasi and also realized the seismic map of the buildings in this area.

13. Casiana Marcu, Crenganis Loredana, Cristina Catita, Florian Statescu: *A GIS based assessment of renewable energy sources in Romania and its impact on isolated areas*

Taking into account the significant potential of renewable energy sources in Romania, it is reasonable to use it in order to develop Romanian cities and regions. There are some current technologies that may be applied to urban sustainable development, such as new-generation photovoltaic panels, systems of passive heating of water, wind energy and solar. This paper presents an application of Analytic Hierarchy Process for selection of renewable energy sources and technology in context of Central Region of Romania. Three options solar energy, wind energy and hydropower have been evaluated based on selected criteria. The objective of our working paper is to analyze the renewable energy development policy in isolated areas of Romania. Renewable sources of energy play an important part in the sustainable supply of energy and in the sustainable economic and social development. Using a GIS model, the aim is to demonstrate which of the analyzed renewable sources of energy is the most convenient to be used in a sustainable system.

14. Mirela Madalina Trelia, Georgiana Ancuta Caluta, Alexandra Ramona Sima, George Puenaru, Toma-Alexandru Radu, Alexandru Calin: *The requirement of implementing GIS in urban development*

The main activities of urban landscape planning consists in exposing the strategies, the politics and the programs meant to aid a sustainable development of the environment through the entire national territory and also their proper development according to the legal framework. Along with large scale automation of the technological processes, shows up the

need of using a digital support that allow us to obtain a informational system. This kind of system can be used for activities such as: a proper spatial development, protection of natural and built heritage and improvement of living conditions in urban and rural areas.

15. Elena-Cristina Ilie, Stefana Ioneanu, Ionela Petrusi-Rosianau, Alexandru Calin: GIS in tourism

GIS can be used in tourism as a decision making instrument regarding sustainable planning, impact evaluation and visitor flow management. Tourism has always been considered a suitable environment to expand the horizons of human interests. (Eagles, 1997). It is a major factor in the development and exploration of historical, natural and cultural heritage of nations. Therefore, it indirectly serves to improve cultural understanding by both residents and foreigners. Internal tourism creates an understanding and appreciation for local attractions, and consequently improves sustainable tourism.

16. Gabriela Biali, Paula Cojocaru, Cornel Cristian Teresneu: Studies of developed with the GIS technique, concerning the usage of the lands in relation to the relief and soils factors

Knowing how to use the lands on a certain territory is very important and a current topic, consisting in the accumulation of precious information for various fields (hydrotechnical and hydroameliorative improvement, environment, cadastre, etc). The paper presents an analysis of the usage of the lands on a vast area, as well as the reports/relations that these have with various geographical factors through an optimal improvement of the territory. In order to develop such a complex study one has to have in mind the fact that the private property represents a restrictive factor which is not good for the precision of the obtained data, moreover, a solution would be a spatial database which can be processed in a GIS program. The software that was used in this paper is TNT Mips 7.3, with its help we can research a territory both under the aspect of the lands usage as well as according to its dynamics in relation with the geomorphic factors, an analysis that would be practically impossible without the GIS technique.