FOURTH

ROMANIAN-BULGARIAN-HUNGARIAN-SERBIAN

CONFERENCE

Geographical Research and Cross-Border Cooperation within the Lower Basin of the Danube

ABSTRACTS
of the oral and poster presentations

VIDIN – BULGARIA
15–17 September 2016

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FOREWORD

Dear conference participants
Dear conference guests
Dear friends and colleagues

It is our great pleasure and honor to warmly welcome all of you to the 4th ROMANIAN-BULGARIAN-HUNGARIAN-SERBIAN CONFERENCE. We are delighted to have you here in Vidin, Bulgaria, to share your scientific achievements and expertise. Thank you very much for your participation!

We would like to remember the success of the previous conferences held in 2010, 2012 and 2014 where we have experienced a growing number of participants. Following this success we organize the 4th conference as a multidisciplinary and intercultural scientific event which presents the results from research work in all fields of geography and related disciplines with the accent on cross-border cooperation within the lower basin of the Danube. Our aim is to draw the attention of the researchers and the society to the environmental and socio-economic processes which have specific regional importance.

One of the main tasks of the science in the modern society is to improve the interaction between researchers, government institutions, NGOs and business. We have no doubt that previous studies of geographical sciences have achieved high public recognition and they have contributed significantly to the constructive participation of the academic community in the development of an effective policy for solving the problems related to the interaction in the system "human – environment"

The 4th Romanian-Bulgarian-Hungarian-Serbian Conference offers the participants the chance to meet old and new friends, to strengthen the relationships and to start collaborations. We sincerely hope that this conference will lead to deepening and improvement of the cooperation between research institutions and the society on different territorial levels and will bring to further development of geographical sciences.

We wish all the participants attending the conference the fruitful discussions and new academic contacts for expansion of international collaboration. We hope that all participants will have a memorable experience and a wonderful time in Vidin, Bulgaria, and will carry pleasant memories of the Bulgarian hospitality.

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CONFERENCE AIMS

This interdisciplinary and cross-cultural meeting welcomes presentations on geographic research and cross border cooperation within the Danube basin. The event targets a broad spectrum of participants, recognizing the multidisciplinary research in geography and other related disciplines. The conference aims to:

Present the status of scientific approaches within the Danube lower basin

Discuss the role of geographical research in cross-border issues

Bring together scientists, academics, practitioners with a view to strengthening and promoting the cross-border cooperation

Define the priorities concerning various aspects of geographical research

CONFERENCE THEMES

I. Geography, Governance and Local Development
II. Cross-border and Transnational Cooperation
III. Environment, Risk Assessment and Management
IV. Climate Change and Water Resources
V. GIS, Landscape Analysis and Landscape Planning
VI. Cultural and Political Challenges in Geography
VII. Population trends, Human Mobility and Emigration
VIII. Sustainable Tourism Policy, Planning and Development
IX. Geography Education

CONFERENCE TIME

15–17 September 2016

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ABSTRACTS

of the oral and poster presentations

OBSTACLES AND STRENGTHS FOR A COMPETITIVE SOUTH-EASTERN EUROPEAN SPACE

Ioan Ianos

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South-Eastern European space is the poorest area on the continent. In our intervention we will try to extend the development vision at the whole East-European space. Usually, the majority of studies are focused on the EU members only, and very few of them are concerned about the entire area. The last years of European development show an increasing gap between this periphery and European core. Searching solutions to mitigate the European discrepancies and to alleviate these dangerous trends for the future should have an appropriate framework for the next steps. The first step is to make an ojective analysis on the obstacles and strengths of this area. This presentation defines the weaknesses of this area, starting from the history until present-day geopolitical situation. How the people could realize that together it's possible to touch the performance in the territorial development? Historical tolerance, proximities, complementary resources, dispersion of good experiences a.s.o. could represent some solutions for diminishing the role of obstacles. This area has many strengths, and the capacity of decision makers at all levels is essential to valorize it. Taking into account the human potential with its stock of intelligence, natural resources, the importance of the metropolis in the development of SEE space, this space has the chance to become more competitive. At the same time, the opportunities created by the Danube Valley, the Mediteranean Sea and Black Sea constitute real premises to accelerate the development. Obviously, another huge opportunity is represented by the European Union countries, which which serve as an axis for this space. From strategic point of view, it is very important to define and implement a sustainable and fruitful cooperation policy using the regional resources and their diversity.

Key words: territorial diversity, development discrepancies, regional cooperation, competitive space, South-Eastern Europe

FLOODPLAIN REHABILITATION IN HUNGARY

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Floodplains are usually terrains of good water availability and, therefore, valuable agricultural areas. In the morphological floodplain of the Hungarian Drava River, the constant entrenchment of the riverbed and dropping water levels, coupled with environmental change, induced unfavourable trends, i.e. increasing frequency of drought. To counter negative trends in groundwater levels and to bring socioeconomic progress to the region, a large-scale development project, called Old Drava Programme, has been launched. A water replenishment scheme stands in the focus, which is meant to improve water availability in the floodplain through raising water levels in the oxbows and indirectly improve soil moisture conditions for both agricultural and protected natural areas. For the assessment of the success of the water governance scheme, more detailed assessments of possible water sources, soil conditions and vegetation cover were necessary. We studied hydraulic connectivity between the oxbow lake and groundwater in the environs, using data from groundwater observation wells. The assessment of the present water replenishment project indicate that hydrogeological conditions induce significant losses to groundwater and indirectly to the Drava River. The groundwater table cannot be stabilized since groundwater is drained by the gradual incision of the Drava channel. The envisioned water replenishment will certainly exert positively influence to some ecosystem services (such as floodwater retention, aquatic and riverine biodiversity), but others (such as groundwater recharge, water purification, sediment and nutrient retention, carbon storage) will remain unaffected or even show deterioration.

Authors are grateful for financial support from the Hungarian National Scientific Research Fund (OTKA, contacts nos K 104552 and 108755).

Key words: floodplain, drought, groundwater, oxbows, rehabilitation, Drava River, Hungary

BORDERS AND BORDER REGIONS WITHIN THE DANUBE BASIN

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The average size of the member countries of the European Union Strategy for Danube Region (EUSDR) is approx. 75 000 km2 which means that significant part of its population lives close to the borders. 42,7% of the total surface of the macro-region belongs to direct border areas (in a distance of 25km at maximum) which underlines the importance of cross-border cooperation in the strengthening of the internal cohesion of the region.

My presentation is based on the results of two research projects carried out by CESCI during the previous years: the regional analysis of the Danube Transnational Programme (DTP) and the project called 'Crossing the borders' realised in line with the road map of the PA10 of the EUSDR aiming to unfold the potentials and experiences of cross-border cooperation within the macro-region.

The main points of the presentation can be summarized in the followings:

there are major differences between the socio-economic conditions of the member countries of the EUSDR;

the macro-regional strategy and the DTP have been launched with a view to strengthening territorial, economic and social cohesion within the Danube basin, thus decreasing differences in development levels;

the separating effects of the borders clearly hamper this cohesion building process, consequently, cross-border cooperation in general assumes particular significance therein;

apart from the importance cross-border cooperation in general has, institutionalised forms thereof have direct impact on territorial cohesion and on the development of a common regional identity.

Key words: territorial cohesion, cross-border cooperation, macro-regional strategy, EUSDR

FOREIGN DIRECT INVESTMENTS IN SERBIA AS A FORM OF CROSS-BORDER COOPERATION

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The forms of foreign direct investments, that represent the instrument of cross-border cooperation, are Greenfield and Brownfield investments. On the territory of the Republic of Serbia, during the period 2000–2016, were established 151 Greenfielad and 15 Brownfield companies.The sum of investments of these 166 companies was near € 7.000.000.000.The origin of the capital is from 18 European countries, then from United States, Taiwan, China, South Korea, Canada and India. The largest number of investments is from Italy (30), Germany (29), Austria (17) and Slovenia (16). Most Greenfield and Brownfield companies belong to the secondary and tertiary sectors of the economy, while 22 companies belong to quaternary sector (real estate, tourism, financial, insurance and pension, telecomunication, film industry, software and ICT).

The methods of analysis, synthesis, comparative and mapping were used in this paper. Data were collected from domestic and foreign scientific papers, as well as from the official electronic database. Given data are connected to the traffic network of Serbia, and the goal was to realize its influence on choosing locations for foreign direct investments.

Favorable geo traffic position of the towns, where the company seats are located, has great significance in the work of these companies due to the reduction of transport costs. This paper analyzed companies' selection of location and their position in relation to the main roads in the country – Corridor X. Zonation of companies and towns where they are located, depending on their distance from the corridor X, were processed in Tatuk GIS software program. Results showed that the most of companies (102) were located at a distance to the 10 kilometers from the highway.

Key words: Greenfield and Brownfield investments, cross-border cooperation, Coridor X, TatukGIS software program

THE GEOGRAPHIC PASSPORT – A SYNTHESIS BETWEEN ISARD'S INDEX OF LOCALIZATION AND MATHEMATICAL PROPERTIES OF PROPORTIONS

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Spatial imbalances/disproportions of social development are a geographic axiom predefined by undeniable natural determinism. The indeterministic social influence on them may either slightly reduce or significantly increase them. Traditionally, the measurement of the spatial imbalances is done through specific indexes and coefficients introduced by researchers such as Pearson, Spearman, Gini, Hoover and Isard. Each of them focuses mainly on the degree of concentration and specialization in a particular indicator in order to provide comparative numbers for an unlimited number of units.

Our research uses the assumption of entropically closed essence of any statistical territorial unit. As main methodological basis serve mathematical properties of proportions used for hierarchically subordinate statistical closed territorial systems. In this way each territorial unit could be represented through a geographical passport, which presents it through an unlimited number of uniform comparable proportional indicators.

The geographical passport is a complex method, which is used for the execution of a qualitative comparative analysis of smaller compared to larger units closed due statistical reasons. It can be used for settlements, municipalities, countries and regions.

Key words: spatial imbalances, localization index, properties of proportions, closed territorial unit, geographical passport

CHALLENGES OF SCIENCE-SOCIETY INTERACTIONS IN THE FRAME OF SUSTAINABLE DEVELOPMENT

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Effectively tackling problems of sustainable development such as climate change, poverty, and biodiversity loss will require a different perspective on the role of science in society. Based on the understanding that knowledge generation processes go hand in hand with governance processes, sustainability science and the science of ecological economics promote transdisciplinarity and participatory procedures as fundamental for conducting academic research dealing with nature-society interactions. Engaging with non-scientific actors such as local lay persons, civil society representatives, businesses, and other stakeholders promises the empowerment of communities and the discovery of practical solutions. While this novel methodological approach has been increasingly applied in Western societies, its adoption by scientific researchers in the context of transition economies remains relatively low. Employing Bulgaria as a case study, the investigation examined the interactions between academia and practice through a series of expert interviews and policy documents review. Preliminary findings show that no transdisciplinary research designs can be found at the national level. It is the objective of this paper to raise awareness about the nature and potential of the participatory and transdisciplinary approach. Furthermore, recommendations about the design of educational policies and research programmes for sustainable development are given.

Key words: sustainable development, scientific knowledge production, governance, participatory approaches, transdisciplinarity, Transition Economies, Central and Eastern Europe, Bulgaria

ASSESSMENT OF HUMAN PRESSURE ON THE ENVIRONMENT. CASE STUDY: GRECEŞTI (DOLJ COUNTY, ROMANIA)

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The Greceşti settlement is located in the north-western part of Dolj county, at the boundary with Mehedinţi county, at a distance of about 50 km from Craiova municipality. The central position in the Bălăciţa Piedmont determined the specifics of the main farming activities carried out by the locals, crop production and raising animals.

The steady decrease in the number of people starting 1977 has had an impact on the degree of human pressure and environmental transformation. Thus, in order to achieve a situation regarding the degree of the environmental transformations by human activities, there were calculated a series of indicators to assess the landscape (indicators of the landscape naturality, the environmental change, human pressure by demographic trend and not lastly the human pressure indicators on different land use categories). To achieve this study, statistical data have been processed for a period of over 30 years at the territorial administrative unit level, aimed at assessing the type and size of human pressure.

The temporal dynamics of the environmental indicators is evidenced by the choice of some benchmark years 1977, 1992, 2002, 2012 and 2015 to which are added data and recent cartographic materials from 2005 and 2015. Using orthophotos in GIS and the digital interactive map of Google Earth Pro software facilitates spatial analysis of changes in the last 10 years in the land use and land cover.

The field researches conducted in 2016 confirm the results of the research and visually sustain the human pressure on the environment.

The assessment of the environmental status by calculating all these indicators allow to determine the damage to ecosystems and natural components of the landscape, and represent a warning to local and regional authorities.

Key words: human pressure, land use changes, index, Greceşti

NEW PARADIGMS OF THE TERRITORY MANAGEMENT FOR 21TH CENTURY. SHARING SOLUTIONS OF SUSTAINABLE MANAGEMENT AND PROMOTION OF RIVERS AREAS. A CHALLANGE FOR LOWER DANUBE AREAS

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The World Economic crisis from 2007 leftus a dramatic situation where the role of Public Intistutions to manage the Territory and provideat the needs of populationsis more and more week This trend joint at the Climate Change and the Strategy of Sustainable Development (UNFCCC-COP21 and Paris Agreement, UN approved Document "Transforming our World: the Agenda of Sustainable Developmet for 2030) push the localareas to research and try new possible ways to solve the question of the adaptationat the Climate Changeand to garantee, for the future generation, the conservation and promotion of all potentialities of each territory and identary areas.

The vision to ward new paradigms, that joining tradition and innovation, the approach of the Smart Communities and Smart Land, the bottom up new model of Territory Governanceas the Territorial Contract Management, appear a possible good way to combine the territory risk management with solution development driving and sharing by the local populations.

The authors present in this sens their own large experienceas in the research, that in project, as in teaching and training in this innovative approach that isstrictly linked with the target of the SDG's 2015–2030 and the Europe 2020 (smart, sustainable and inclusive).

This representev shared and democratic model could be adopt, specilally in the form of the River Contracts, in the Lower Danube Basin as a special Project also of the Water Action Group of the Euopean Union where the auhors are promoters.

The paper show the concrete proposal for the Lower Danube Area.

Key words: Sustainable Development, Climate Change Adaptation, CLLD, Territorial Contracts Management, River Contracts

FACTORS FOR THE ECONOMIC MARGINALIZATION OF NORTHWESTERN STATISTICS REGION AND THE INSTRUMENTS FOR ITS OVERCOME

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The Northwestern statistics region is the most backward one in social-economic sense in the whole European Union. Its territory is in a process of accelerated depopulation. Its demographic structure is characterized by an inverted age structure of the population. Deteriorated are also the quality and quantity parameters of the factor workforce.

The prevailing part of the municipalities in the region have high rate of unemployment. The infrastructure on its territory is in very bad technical conditions and with low level of functional interconnection. The quality of life of the population as a result of these factors continuously deteriorates. All these unfavorable processes and problems deprive the region from potential for a future social-economic development.

At the same time, this is the Bulgarian region which is geographically closer to the "heartland" of the EU. The relative advantages arising from its geographic position and the implementation of certain policies can become factors for the economic growth of this region. In order to generate positive territorial synergy, a profound analysis of the factors that led to this situation should be carried out.

The article analyses also the factors that led to the economic marginalization of the Northwestern statistics region and it justifies some policies and methods that can lead to its overcome.

Key words: Northwestern statistics region, economic marginalization

GEODIVERSITY AND GEOHERITAGE IN GEOGRAPHY TEACHING FOR THE PURPOSE OF IMPROVING STUDENTS' COMPETENCES IN EDUCATION FOR SUSTAINABLE DEVELOPMENT

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The problem of sustainable development is becoming one of the most pressing issues at global, local and individual level because of the climate change, pollution, rapid development and changes in the global information, economic and production sector, but also changes of the value systems. In this sense, sustainable development has become one of the most important strategic and educational policy issues in Serbia as an integral part of lifelong education. The aim of the paper is to highlight the potential of geography as a subject in primary and secondary schools with special reference to the content of geoheritage and geodiversity in the function of education for sustainable development. Using comparative and descriptive analyses of examples of good practice in the world and Serbia in regard to studying the content of geodiversity and geoheritage, through research, students' field work and a holistic, interdisciplinary approach to teaching,we will indicate both the opportunities to use and insufficient use of these contents for the purposes of education for sustainable development. Pointing out the advantages of learning strategies in the teaching of geography that encourage active, investigative approach to teaching has the objective to enable students to acquire competencies for sustainable development, form the basis for raising awareness, responsibility and committed behavior of an individual for the preservation of geoheritage and geodiversity of the country as part of the national heritage of Serbia.

Key words: geodiversity, geoheritage, sustainable development, the teaching of geography, field work

MEASURING THE COMPLEX SOCIO-ECONOMIC DEVELOPMENT OF THE DANUBE-ADJACENT NUTS2 REGIONS

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The existing inner socio-economic discrepancies are one of the major stumbling-blocks to the sustainable development of the Danube region and to the successful realization of its different macro-regional development programmes, strategies, and action plans. That is why it is of extreme importance to assess these discrepancies on a complex base, going beyond the analysis of single indicators. From that point of view, we suggest that sophisticated methodology and approach are needed, similar to those used to elaborate thorough European spatial development models. In order to measure the current socio-economic spatial development of the Danube regions on a complex basis, we apply the already attested author's "Development and Prosperity Index" (DPI) calculated by using the latest available data for 8 key indicators. By contrast with the majority of the scientific studies that build their conclusions on NUTS0, or rarely on NUTS1 level analysis, our research is suited at NUTS2 level so that we can take a detailed picture of the situation in the Danube region. Another significant difference from the mainstream studies is that we concentrate predominantly on the Danube-adjacent NUTS2 regions, but not on the whole area (as defined in the EU Danube Region Strategy). That approach provides us with an opportunity to divide the study in two important stages. Firstly, we make a comparative analysis and a classification of the Danube-adjacent NUTS2 regions providing empirical evidence for the significant complex socio-economic discrepancies between them. Secondly, in a view to estimate the development role of Danube in different countries, we confront the DPI results for Danube-adjacent NUTS2 regions against those for the other regions in a given country. Although this approach is characterized with certain conditionality considering that development is a function of many diverse factors, the results of the study provide solid ground for building up adequate future policies.

Key words: Danube regions, socio-economic analysis, regional development, complex assessment, Development and Prosperity Index

COMPARATIVE ANALYSIS OF THE FDI'S SPATIAL LOCALIZATION MODELS IN THE DANUBE PROVINCES OF BULGARIA

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The Danube provinces of Bulgaria are among the least developed NUTS2 regions in the country and in the EU. From that point of view, overcoming of their socio-economic underdevelopment is not only of particular interest for the Bulgarian regional policy, but is also at the base of realizing a successful strategy for sustainable territorial development of the cross-border region Romania-Bulgaria. Being a key factor in the discourse of regional development, the FDI should be scrutinized in a view to uncover the main regularities and trends in these provinces, as well as potentials and perspectives ahead of the separate administrative units. The analysis of some key indicators connected with dynamics and distribution of the FDI stocks and their per capita ratio, with the FDI density, and with the proportion FDI-GDP, demonstrates lack of a distinct and typical for all Danube provinces of Bulgaria trend in the investments activity. However, we find out a common feature in their spatial localization models– the predominant concentration of the FDI in the provincial centres. The study also discloses the correlations between sectoral structure and FDI attraction, as well as FDI's role for the changes in some key economic, social, and demographic indicators' values in these provinces. The quantitative analysis' results are complemented with qualitative characteristics of the processes as we put special emphasis on factors such as: the insufficient capacity for creating agglomeration effects; the lack of clusterization based on joint initiatives of the provinces; the relatively weak impact of the free trade zones and the industrial zones; the poor connectivity with the national transport system. The elaborated systematic territorial study of the foreign investments' spatial models in the Danube provinces of Bulgaria is a solid base for designing/implementing a differentiated, adequate, flexible, and proactive regional and local policy.

Key words: foreign direct investments, localization models, Danube regions, regional development, Bulgaria

THE ROLE OF RURAL INNOVATION IN HUNGARIAN VILLAGES

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The research had a dual purpose: on one hand it examined the definition and components of the rural innovation, while on the other hand it gave an analysis of the recipient space regarding the social and economic innovation. This presentation clarifies the related definitions, gives an empirical analysis of the innovation case studies, and through the experiences of several interviews it also determines the main geographical, social and economic qualities, which contribute to the settling of an innovation in the rural areas. Furthermore the recipient space can also generate additional innovations, as the innovation of an area depends largely on the holding capacity, the openness of the society and the economy as well as on the human capital. The paper also examines the interaction of the social and economic innovations, and shows through cases how they can strengthen the innovation-willingness. Finally the spatial distribution of the collected examples will be shown, along with the territorial specifics and the characteristics of the innovators.

The introduction of innovations in the rural areas of Hungary is not exceptional; elements and cases for both social and economic innovations can be seen. Economic innovations are more related to the private sector, businesses, although economic renewals are often initiated by municipalities as well – although such economic innovations implemented by municipalities are related to social innovations in most of the cases. With a large possibility social innovations are followed by organisational and later some economic innovation, while innovations initiated in isolation are less likely to lead to the appearance of the other two types of innovation. The analysis of the cases collected highlights that rural innovations are diverse and multi-actor processes which from many aspects take place in the way classic innovation processes do.

Key words: economic, social innovation, empirical analysis, interviews, territorial specifics

INDUSTRIAL AREAS IN BULGARIA – CONSERVATION, RENNOVATION AND SMARTH GROWTH

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The district cities are the first rang-size cities of Bulgaria. Their total number is only 27 and the cities concentrate the most important human, technological and financial capital of Bulgaria. The spatial planning progress of the 19th and 20th century, the way of urbanization and the industrial agglomeration made possible each district city to has its own industrial zones. In our days there are three basic vectors of development for the industrial zones: the first one is the industrial zones suffering structural difficulties - result from the non-market way of privatization of factories in the ninety years of the 20th Century. They are the oldest ones, mainly established at the socialistic era, and the infrastructures are misbalanced, some are overcapacity and non-effective, others are demolished or in very poor condition. The second one vector represents the new industrial areas created in the beginning of the 21st Century. There are located new factories and companies which prefer to be away from the first group and to build their own infrastructure and highly organized spatial structures. The third group are the economic zones established with the adoption of the Integrated Plans for city renovation and development which takes into account part of the existing city industrial zones, as well as, new areas which could receive public financing by the operative programs.

The paper researches the current spatial organization of the district cities industrial zones, the spatial projections that will took place in the current planning period, and the functions that will took place in the city systems.

Key words: Industrial zones, industrial areas, smart growth, integrated approach, industrial spatial organization, rang-size cities

CROSS-BORDER SHOPPING OF SLOVAK CONSUMERS IN AUSTRIA: CASE STUDY FROM HAINBURG AN DER DONAU (AUSTRIA)

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For the past 25 years significant transformation processes have been identified in many sectors of post-communist countries that have both an economic and a spatial character. The transformation of the economy after the 1989 resulted in notable changes in (czecho-)slovak retailing. Besides the new types and forms of shopping in Slovakia, consumers also discovered new retail markets of nearby countries. Bratislava, the capital city of Slovakia, with its position and rapid economic growth has found the Austrian retail especially attractive. All these and many more factors (accessibility, retail options, price and quality, etc.) reflected in the consumer behavior change of Bratislava inhabitants as well as the suburbs. This paper examines the cross-border shopping behavior of Slovak consumers in the 10 km distant Austrian village Hainburg an der Donau. Empirical survey took place in front of the Danubia Gallery shopping center on the sample of 928 respondents. The survey results show that consumer preferences of Austrian retail is higher than the Slovak. Presented paper discusses the reason of this situation and provides the possible consequences of this trend.

Key words: cross-border shopping, consumer behavior, Hainburg an der Donau – Bratislava, shopping centre

GEOGRAPHICAL CHANGES OF THE BOSUT RIVER BASIN

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In the east part of the Republic of Croatia there is an agricultural area with a long tradition. This area is part of the Sava valley which natural features were created long time ago. But, in the last few hundred years these natural features were significantly modified by human activities. This area has continental climate and relatively little rainfall. Hydrographic backbone of the newly formed valley is the Bosut River with its few major tributaries (Bić River and Spačva River). Bić-Bosut basin extends to the field of three Croatian counties, and it is in the backbone of life for a number of their municipalities. The lower part of the basin is located in the Republic of Serbia and is the life part of the local population. Bić-Bosut basin ones were swampy and forested lowland area on the civilization crossroads. Then it becomes mainly an agricultural area, been developed within a united state on the basis of socialistic planning and state ownership. Today this area is marked by damage and neglect of previously built hydropower system. Also, valley is marked with the adaptation and extension of the divided basin which is situated on the border of the three neighbor states with different hydrotechnical organization.

This paper describes the climate, hydrological and morphological characteristics of the Bić-Bosut basin and its complex hydrotechnical system. The agricultural production in this area is aided by developed amelioration drainage, but runoff in the basin is very specifically. River beds are regulated, slopes of them are very small, and many local population do not know the name of the individual streams and direction of its water flows. Paper also points out the specific problem in this region in the period of small and high water, and the possible challenges due to climate changes and adaptations for survival. The local challenges are also social relations where benefits and adversity can contribute to the unification or misunderstanding between neighbor countries.

Key words: Bosut River, hydrotehnical system, geografical changes

URBANIZATION IN THE AREA OF DANUBE RIVER IN SERBIA

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Rivers have always had a major role in the founding of cities, which can be explained by the fact that the agricultural and industrial activities are very dependent on the proximity of a water resources. Also, the river has a significant role as a waterway, which is of great importance for any settlement.

The area of the Danube band, because of its great importance, has caused an increased concentration of production, capital, traffic, population and settlements both in Europe and in the Republic of Serbia. The Danube region in Serbia covers 15.2% of its territory and in it lives 28.3% of the total population of Serbia.Almost 70 settlements have direct access to Danube river, among which is the City of Belgrade, as the largest urban agglomeration, as well as other important centers in Serbia.

Urban centers are the main subject of this paper, and all the settlements that are located on the bank of the Danube, but also those in immediate vicinity. The population density on the river banks, the size and the length of the settlements on one or both sides of the river were analyzed. Also, the paper presents the basic urban characteristics of the upper, middle and lower Danube in Serbia, which established the difference in the development of the three sectors and the reasons that have contributed so that certain sectors of the Danube are less urbanized compared to the others.

Key words: Danube, urbanization, urban region, Serbia

PUBLIC INFRASTRUCTURE POLICIES AND INDUSTRIAL (ECONOMIC) GEOGRAPHY

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This work proposes a simple way to analyze some of the effects of regional policies on industrial (economic) geography, regional income disparities and growth. For this purpose, it is used the "localized spillover" model, in which both the location and the endogenous growth rate are simultaneously determined. The model is extended to allow explicit consideration of different public policies such as infrastructure policies, transfers and subsidies to technology transfers, etc. An important message of this work is that the presence of localized technology spillovers implies that a trade-off exists between spatial efficiency and equity when infrastructure policies reduce the transport costs either between or inside regions. Public policies that facilitate the interregional diffusion of technology spillovers have very different implications and do not have this trade-off. European policy makers believe that regional policies are not only necessary to improve equity but also efficiency. To give a change to this argument, this work presents an analysis of regional policies in the presence of congestion effects. Multiple equilibria may appear even with capital mobility: a "good" equilibrium with high growth and low spatial concentration and a "bad" equilibrium with low growth and high spatial concentration. In the presence of congestion costs, policies that improve infrastructure in the poor region can improve growth and reduce inequality. Again, however, policies that facilitate the interregional diffusion of technology spillovers are better.

This work is divided into three sections. First introduces interregional and intraregional trade costs in the localized spillovers model and analyses different policy experiments, like transfers to poor regions, better transport infrastructures inside regions, better transport infrastructures between regions and policies towards technology spillovers. The second section is dedicated to the congestion effects. Finally, non-linear effects of public policies are discussed in the third section in a model with agglomeration.

Key words: "localized spillover" model, public policies, economic geography

TERRITORIAL DISPARITIES IN THE SERVICE INFRASTRUCTURE IN ROMANIAN DANUBE VALLEY

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The territorial patterns of socio-economic development in the Romanian Danube Valley show the overwhelming predominance of the socio-economic development pattern below the average in Romania. In this context, the development and upgrading of health, educations, public utilities of local interests and transport infrastructures are an imperative necessity. The paper aims to explore the current conditions of all the above mentioned types of infrastructure at micro-scale (LAU2-NUTSV). The study relies on the official statistical data available at LAU 2 (NUTS V), the results provided by the TEMPO-Online time-series published by the National Institute of Statistics (2014). The authors have selected some specific statistical indicators in order to highlight the most developed and less-developed areas in terms of health, educations, public utilities of local interests and transport infrastructures (e.g. hospital beds/1,000 inhabitants, physicians/1,000 inhabitants, number of higher education graduates (students)/100,000 inhabitants, (% of dwellings connected to the public sewerage system, (% of dwellings connected to the water supply system, goods transported on inland waterways (thousands tones/km). The statistical indicators selected are standardized and grouped by four categories, reflecting the main types of infrastructure analyzed (health, educations, public utilities of local interest and transport). Finally, the authors were able to compute secondary indexes and the Index of Health, Education, Public utilities and Transport Infrastructure Development (IHEPTD) as Hull Score with a mean of 50 and a standard deviation of 14, revealing the infrastructure development levels (high, average and low), correlated with the human resources involved in the provision of services specific to each type of infrastructure analyzed and with the population benefitting from these services. In terms of health, education, public utilities of local interest and transport infrastructure, this study shows that the majority of Danubian LAU2 registered low and very low development levels; high and very high development levels are specific to the large urban centres and to some rural settlements located close to town or which are tourist destinations.

Key words: Romanian Danube Valley, health, education, public utilities of local interest and transport infrastructure, territorial disparities

THE "LOWER DANUBE" SYNTAGMA – A KEY FOCUS IN THE ROMANIAN PROJECTS FOR EUROPEAN FUNDING IN SOUTH-EASTER REGION OF ROMANIA

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The paper approaches the situation of the inferior segment of the Danube, identified in numerous programmatic and political documents with the syntagm Lower Danube. The first part of the paper presents the general features of the inferior course, be they physico-geographical, economic or social, which underlie the use of the above mentioned appellative. In the second part, the research is more specifically focused on the Braila-Galati river-maritime segment alone, more exactly on the two port cities. The aim of the paper is to identify the projects conducted in the two cities under the emblematic mark of Danubian riparianness after joining the EU. Accordingly, a study of the SE Regional Agency's documents was conducted, as well as of the materials placed at our disposal by the European Documentation Centres. The study emphasizes the typology of the projects according to the chosen objectives, the categories of actors involved and the degree of success, namely the impact of the projects on the local development of the two cities. Thus, those that stand out are the projects concerned with stimulating innovation and entrepreneurship, the preservation of natural and cultural values in the Lower Danube region, improving connectivity and supporting the transition to a green economy, as well as those aimed at establishing strategic partnerships.

Key words: Lower Danube, Galati, Braila, European funds

POST EARLY PLISTOCENE PATTERN OF THE SOUTH MOESIAN MORPHOSTRUCTURAL ZONE

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The South Moesian morphostructural zone spreads the southern marginal part from the Moesian continental micro morphotecture. It is regional corresponding with the Lower Danube hilly plane in North Bulgaria. The zone is limited between the Lover Danube river to the north, the Fore Balkan and Stara planina Mountains to the south, the Timok river to the west and the Black sea to the east. This area is representing one of the most contemporary fragments from the large post Early Pleistocene orthoplan in the North-East part of the Balkan Peninsula. The South Moesian morphostructural zone includes the relics from the Bregovo, Kaylaka, Derventska, Svetlen, Razgrad, Lomtsi, Lilyak, Sarta, Ovche pole, Stana anteclises, Shumensko plato complex anteclise, Kula, Archar, Loznitsa, Provadiya, Momino syneclises, Stoyanovo, Suhindol, Dve mogili, Byala, Popovo, Samuil, Fragnen semisyneclises, and Ludogorie, Dobrich homoclines.

The later normal faulting in the central parts of South Moesian morphostructural zone have separating the most-rare Valchedram, Byala Slatina, Knezha, Trastenik, Dermantsi, Levski, Belene, Pavlikeni, Lovech morphostructural blocks.

The area of South Moesian morphostructural zone distinguish with one generation of platform morphostructures and the beginning of the Late Holocene-contemporary orthoplan building.

The morphogene processes in the Bulgarian continental microplate are connected with the very important role of the syncinematic listric tectonics. This type of the Quaternary faulting was not (with some very seldom exceptions) constituted in the area of the South Moesian morphostructural zone.

Key words: continental micro morphotecture, anteclises, syneclises, semisyneclises, homoclines

CIRCULAR AND ELLIPSOIDAL TECTONIC STRUCTURES IN THE HINOVA – NEGOTIN – VRATA AND SALCIA – WEST VIDIN – LOM AREAS

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A summary analysis of maps in relief, focused on the Danube course downstream of the Danube Gorge trail, suggests the existence of circular or ellipsoidal type structures of varied sizes. Such impression is accentuated by the study of geological maps scale 1:200.000, but also by a morphological analysis of the topographic maps scale 1:50.000. In the area bounded by the localities Hinova, Crivina, Negotin and Vrata it can be imagined three large structures, partly overlapping, including other several smaller structures. In relation to them, northwards, two other circular it can be outlined, somewhat smaller. In terms of size the largest structure has a diameter of 30 km and the smaller has a diameter of 8 km. Other structures of this type, much broader, seem to individualize further south, but with ellipsoidal forms. Their western limits can be traced in the area of localities Salcia and Vidin and they seem to extend until the fault that which marks the Danube way upstream of Lom. All these structures are partly bounded by curved fault lines along which the compartment from inside of the structure is lowered. The curved faults are affected by a series of rectilinear faults, with different directions, which delimit different sectors of these structures. Both type of faults sometimes determine the Danube course, that is marked overall by these particular structures. Tectonically we can imagine that the segment of curved faults can virtually enrol in this particular type of structures, most likely due to the Wallachian tectonic phase, and that are affected by newer faults connected with the Passadenian phase. These new faults do not seem to affect the recent Pleistocene lake shores, located at the current elevation of +100 and +50. Obviously such a novel structural perspective should be further pursued through more detailed morphological and geological analysis.

Key words: tectonic structures, Hinova – Negotin – Vrata, Salcia – West Vidin – Lom

URBAN EXPANSION OF "ERBIL" CITY & ENVIRONMENTAL PROBLEMS RESULTING

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Urban expansion of the cities causes many environmental problems. City, "Erbil", like other cities, has seen significant urban expansion, particularly in recent decades and that has caused many environmental problems. This study aims to:1 – Determination of urban expansion of "Erbil" city and its causes. 2 – Determining the environmental problems caused by urban expansion of the city. 3 – Ways to address the problems resulting from urban expansion of Erbil city. To achieve aims of the study and because of its nature is divided into the following themes: 1 – Definition Erbil city and its geographical environment. 2 – Determining the urban expansion of "Erbil" city since the fifties of the last century. 3 – Determining the main reasons for urban expansion of "Erbil" city. 4 – Identify the environmental problems caused by expansion of the city.5 – Submission of proposals for addressing the problem of expansion of the city of Erbil, and environmental problems resulting from it.

Key words: Urban, Expansion, Erbil, Environment, Problems

STUDIES ON PALEOENVIRONMENTAL CHANGES ON THE IV. AND V. TERRACES OF RED HILL (MORAVIA)

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This research is dealing with the last glacial period's (~100 kyr) stratigraphic features in a South Czech loess-paleosol section. We want to compare the almost complete series of Moravian aeolian dust deposits to North and South hemispheric ice core records and Heinrich events. In this paper, we want to provide refined relative chronological data to loess-paleosol section situated on the IV. and V. terraces of Red Hill (Moravia). The last glacial-interglacial loess section is almost complete, all of the interstadial soils can be identified in the series instead of the eroded upper part of the PK I complex.

The newest ice core and deep sea drillings provide new insight into dynamics of Plio-Pleistocene paleoenvironmental and paleoclimatic changes. These new databases of ice cores and deep sea sediments allow us to correlate the climatic fluctuations and the terrestrial, oceanic and atmospheric relationships with various proxies from different environments (e.g. loess deposits). In this case, the almost complete South Czech „Red Hill" loess-paleosol sequence has been compared with the last glacial oscillations. With this comparison, the main aim is to refine the chronological properties of the section. The known intensity, duration and absolute age data of deep sea Heinrich events provide ground for relative dating and correlation of the investigated deposits. Based on these parallelization, the controversial stratigraphic position and ^{14}C data of thin, humic horizons above (and between) thick, well-developed paleosoils (e.g. in the Hungarian Tápiósüly-Dunaújváros loess series) can also be explained. The sedimentary parameters and oxigen isotope data of the series have been used during this comparison.

Keywords: loess-paleosol series, ice cores, chronology, đ^{18}O values

INVESTIGATIONS OF BANK EROSION ALONG THE LOWER TISZA IN HUNGARY

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The paper aims at identifying the origin, mechanisms and types of mass movements along the riverbank and the role of geological (tectonic, sedimentological and geomorphological) and hydrological (river regime and groundwater dynamics) factors in their generation. General predictions of the future spatial and temporal distribution of bank erosion hazard and opportunities for mitigation are also covered in the paper.

Bank erosion is a major driver a river channel processes. Its rates and types can well be studied along the Hungarian section of the Tisza River. Between Csongrád and Mártély, where the tectonic control on the present course of the river is particularly intensive, river regulation measures and geomorphic self-regulation (channel adjustments after channelization) have also been influential in channel formaiton. The sedimentological composition of banks is a fundamental control, but the indirect influences of climate change on riverbank slides and collapses can also be detected. The impact of weather extremes on bank erosion, manifested in river regime, is also studied. With hydrometeorological extremities expected to intensify in the future, bank erosion is becoming a more and more severe hazard along some reaches. Its actual dimensions are estimated by the Bank Erosion Hazard Index (BEHI). The geomorphological control on bank instability is expressed in the fact that most of the movements occurred on the margin of the higher floodplain level and at the outlet of abandoned channels with deep alluvial fill. Implications for flood defence and actual construction activities in towns built right on the river banks are also presented. Future bank erosion hazard is forecast for the studied section. Environmentally friendly solutions with the purpose of reducing this hazard are also proposed.

Key words: bank erosion, sediment sequence, tectonic influence, regulated river, water regime, Tisza, Hungary

PETROGRAPHICAL GRAVEL ANALYSE IN THE VISEGRAD GORGE, HUNGARY

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The fluvial sediments of Visegrad Gorge were investigated by a new petrographical (Fine Grained Pebble – FPE) method. The most simple method for the determination of the geological background of a sedimentary sequence is to examine the mineralogy and petrology of debries eroded from the source area. The accuracy of determination of the petrology of individual rock types and variability of rock serieses depends respectively on number and size of settled grains.

It were identified two different groups of gravelly sediment in the Visegrad Gorge. The ,gravels of high level geomorphologic horizons are Miocene, but the lower units are Pleistocene danubial sediments. Our newest results revealed some interesting information about gravels of Danube Band, which disagree the standard theory of terrace chronology.

Key words: Visegrad Gorge, gravelly sediments, Danube, Pleistocene, Miocene

ENGINEERING GEOMORPHOLOGICAL METHODS USED IN THE REHABILITATION PROJECTS OF DANUBE'S LANDSLIDE-THREATENED BLUFFS- AT KULCS AND RÁCALMÁS (HUNGARY)

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Several significant rehabilitation projects have been and still are executed in order to stabilize the area and protect the settlements of Kulcs and Rácalmás. They are located along the Danube, where the edge of the Mezőföld (Central Hungary) rises with 50-70 meter high bluffs above the river, they were partly built on the heaps of landslides at the side of the bluff, where mass movements occur repeatedly since decades.

The purpose of our research is to explore the geomorphological, geological and anthropogenic factors responsible for these movements by using geomorphological and geophysical methods.

Large scale geomorphological mapping has been undertaken, landforms and the presumed neotectonic events were jointly analysed. The location, magnitude, depth, tectonic lines and depressions of the known quakes have been marked on the geomorphological maps. Causes of land slide occurrences were studied by analysing the lithostratigraphical and hydrological conditions, the zones and directions of subsurface water flow.

The geomorphological research has been completed with various geophysical analysis by applying traditional and innovative remote sensing and in situ methodologies, such as satellite radar interferometry (InSAR), LIDAR, geoelectric anisotropic investigations etc. to uncover the emergence process of the movements.

The different sediment sequences of the bluff – especially the Pliocene red clay and the Pleistocene horizons of fossil soils – and the

groundwater horizons connected with the clayey layers play the main role in the emergence of the movements. The renewal of the movements can be attributable to anthropogenic impacts, subsurface waters, geomorphological forms and buried valleys determining the course of the streams in the northwest-southeast and north-south directions.

Key words: Danube, hight bluff, Hungary, Kulcs, landslide

CULTURAL ROUTES – TRANS-BORDER TOURIST DESTINATIONS WITHIN SOUTHEASTERN EUROPE

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Cultural routes can become interesting tourist destinations because of their thematic and traveling experience, making connections to renowned places, events and personalities. The process of forming cultural routes as tourist products is considered a new principle of protection, revitalization, use and presentation of cultural heritage. Europe in particular, is rich with cultural heritage originating from different historical epoches. This is why within the Europe the renown and most visited cultural routes were formed. In Europe exsist 33 pan-european cultural routes, of which eight routes trans passes Southeastern Europe. The scope this article is to examine the interrelation of Southeastern Europe cultural routes with European cultural routes. The main goal is to determine to what extent their connection to the existing European cultural routes contributed to the tourism promotion of SEE states making them the trans border tourist destinations.

Key words: cultural routes, tourism, destination, Europe, South East Europe

SOME ASPECTS OF THE REGIONAL COOPERATION ON THE BALKANS

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Since the beginning of the 1990-s the political role of the state borders in the Balkans has changed. Gradually they began to transform from barriers in zones of bilateral or multilateral cooperation.

The common European integration includes the creation and development of euro-regions. Within the context of reorganization of the new European space, geopolitical importance of South-East Europe has significantly upgraded. This fact reflects on the interests of the international community in security and development of this region. Despite that the Balkans constitutes an indispensable part of the European continent their incorporation into the new European architecture has been particularly difficult and problematically. They emerge as the most volatile and least integrated European region. There are significant variations among the countries concerning their territory, number of population, as well as the rate of the economic changes. The main forms of regional cooperation have to be concentrated on the domains of transport, energy and communication infrastructure, trade and economic cooperation, environment and security. From this point of view, the economic growth and increase of living standard are the most important problems for all Balkan countries.

Key words: European integration, cross-border cooperation, economic changes

THE DIVIDING ROLE OF THE DANUBE: THE GEOPOLITICAL BACKGROUNDS OF FLUVIAL BORDERS AND BRIDGES

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The presentation looks at, with the assistance of maps and data, how the Danube River became more and more of a border river in the last 200 years. For this we demonstrate the lengths of the border at the different times and the circumstances of their birth. On the other hand, the situation of bridges across the river is specific. The density of bridges is typically different at the various reaches, and this is not only the consequence of physical geographical situation but also the settlement network and the history of the relations among the countries. In the background of this there are several geopolitical issues that are analysed by the presentation.

Key words: International River, fluvial borders, bridges

FLOOD FREQUENCY ANALYSIS OF TISZA RIVER IN PANNONIAN BASIN

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Floods are one of the most common, frequent, hazardous and widespread natural events on the Earth, causing a great loss of life and significant economic damages. Flood frequency analysis (FFA) is still an active field of research.

In this paper we analyzed extreme hydrological situations on Danube River's biggest tributary, Tisa River through the Pannonian plane at Vilok (Ukraine), Vasarosnameny, Szolnok, Szeged (Hungary) and Senta (Serbia) gauging stations.

Our results present advantages of flood frequency analysis defined by two variables: volume and duration of events. Floods were defined as events over selected threshold levels, the selected thresholds were Q10% and Q5%. The volumes and durations of floods were analyzed by annual maximum series (AMS).For selected thresholds ten series were gained. According to Kolmogorov-Smirnov and Cramer-von Mises tests, probability tests and probability plot best fit to the empirical data has log-Pearson III distribution (10 times), then Gumbel (7 times) Person III (2 time) and log-Normal (1 time).This is the first step in defining the best distribution for Danube River and its tributaries in Pannonian basin. The frequency analysis pointed out that the most extreme flood event on Tisa River for investigated period was in the 1970 flood being the largest flood recorded both interms of volumes and durations on all stations, with an averaged return period of 101 years for volume and 125 years for duration of flood wave (except Vilok). As there is no unified FFA for rivers in Pannonian basin, our results show that for Tisza River, the best fitted distribution is log-Pearson III.

Results of this paper can be used as guideline for establishing the official international FFA distribution between these three countries which will improve environmental monitoring, water management and flood prevention policies.

Key words: Tisa River, Floods, Serbia, Hungary, FFA

THE ROLE OF INTERFIRM TRANSACTIONS ON CROSS BORDER INTEGRATION IN EAST ASIA: A CASE STUDY OF INTERLINK AGES BETWEEN BUSAN AND FUKUOKA

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The purpose of this paper is to discuss the cross border cooperation between the non-capital cities in Korea and Japan, with focus on the relationships between Fukuoka and Busan, as a part of an empirical research of the internationalization of non-capital cities in East Asia.

We attempt to (1) define international trade between firms in three aspects, (2) adopt a methodology of international urban system and (3) examine the activities of exporters in Busan. Concretely, we subdivide international trade activities of firms into 3 aspects and analyze foreign destinations based cities, rather than countries. This is one of the most unique features in this paper, compared to previous studies that have paid sufficient attention to relation between countries in international economics and management.

The data is tabulated from the original questionnaire, relying on the directory of 62 different types of exporters in Busan. The linkage between Busan and Fukuoka mainly sits at the apex of the international urban system, from the perspective of the gateway of "Physical Distribution" and "Business Trip"; however, links to Tokyo and Osaka mostly act as "Transaction" and functional cores such as sales channels. Fukuoka airport and Shimonoseki port have been utilized as a gateway. Fukuoka Airport has a promising evaluation concerning accessibility and convenience. Shimonoseki port has certain advantages due to the short time required for customs formalities, brevity of the shipping time and convenient daily shipping schedules.

Key words: cross border cooperation, international urban system, Busan, Fukuoka

A POSSIBLE COOPERATION SUPPORTED BY THE INTERREG DANUBE PROGRAMME: GUIDE FOR FLOODPLAIN MANAGEMENT, BLUE AND GREENWAY PLANNING IN DANUBE REGION COUNTRIES

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Along the Danube river countries, nowadays the sustainable management of the floodplains is a very important question from environmental point of view. In case of floodplain areas we can distinguish many types of ecological, hydrological and land use conflicts. For instance the vegetation of the riparian forests often infected by invasive bush and tree species, and the invasion is spreading year to year dramatically. A big hydrological conflict what we can identifying in floodplains, that the thick vegetation is increase the roughness of the floodplains, and the flood risk, because it is keep back the flow of the river. We can say that the blue and greenway network is very underdeveloped, and separated from each other especially in case it's cross border connections. The recent greenway and blueway infrastructure (cycling routes, trails, kayak ports etc.) are can't ensure the three main functions of the blue and greenways: ecologically corridors of the natural systems; recreational functions, and provide historical heritage and cultural values. The floodplains of the Danube river unfortunately can't fulfilling these multi purposes functions, and benefits of the corridors. Although, in the USA, and Western European countries the landscape planners widely use guides, which can support the floodplain management and planning, in case of the countries of the Danube river basin there is no any methodological guide for the identifying, and minimizing the main ecological, hydrological, and land use generated conflicts. The Interreg Transnational Programme gives a big opportunity to harmonizing the landscape planning systems of the Danube region, and to create the "know how" guides for the restoration and land use management of floodplains and its ecological corridors. Our university is looking for international partners from Danube region countries for this Interreg Danube Transnational Programme.

Key words: Interreg Danube Transnational Programme, floodplain management, greenway planning, blueway planning

CBC PROGRAMMES IMPACT IN NORTHWEST NUTS II REGION OF BULGARIA IN THE PERIOD 2007-2013

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The purpose of the paper is to study the impact of the cross-border cooperation programmes in the Northwest Nuts II Region of Bulgaria in the period 2007-2013. The results to be achieved with the study is to assess the effectiveness of EU CBC programmes in one of the most backward EU NUTS II region and to identify the positive and negative effects of various interventions realized with EU funding. In addition, the study will evaluate the outputs and results of different types of measures, incl. hard and soft projects and their influence on the local economic and sustainable development as well as their contribution to achieving the objectives of EU cohesion policy in the observed programming period.

The conclusion to be made in the paper will be directly related to the cross-border and transnational cooperation with specific focus on particular geographical area. Best practices and challenges also will be identified and related to the needs and objectives of the target region in the new programming period 2014-2020.

Key words: CBC, Programmes, Impact, NUTSII Region

ENVIRONMENTAL COHESION ACROSS THE HUNGARIAN-CROATIAN BORDER: DISCUSSIONS AND COOPERATION ON DIFFERENT INSTITUTIONAL LEVELS

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Environmental cohesion (as a new EU paradigm for a place-based interpretation of environmental justice) has a clear connection to territorial cohesion. Based on this idea, advantages for people can include an equitable distribution of environmental protection and access to environmental services (Layard – Holder 2010). In non-EU countries regional environmental cohesion is used as an instrument to accelerate accession to the EU and it may be manifested as a declaration of environmental diplomacy (Mihajlov 2008). Partly deriving from the above, in my understanding, environmental cohesion across a border can be identified when two regions alongside the border started to cooperate in order to improve environmental conditions and to ensure equal access to natural resources/ environmental services.

The surrounding area of Croatia-Hungary border was closed for a long time. It caused that developments avoided the area on one hand, and natural resources remained mainly untouched on the other. However, the approach of the area was different from the two. Croatia tried to build another water power plant while Hungary tried to create Natural Park. The aim and discussion between the two countries were different until the accession process of Croatia. Finally the disagreement between the two was moderated, by 2015 a UNESCO Biosphere Reservoir was created alongside the border and the post-2010 is characterised by an increasing number of environmental-related cooperation. It seems that environmental cohesion was realised across the border. Is this the situation?

The paper concludes by arguing – based on media discourse analysis and expert interviews – that there are differences in environmental cohesion in territorial sense. There are intensive cooperation areas on local level, however it is leaded by different types of. Croatia is more decentralised in this sense. On state level we could find another picture, Hungary is more engaged to environmental cohesion.

Key words: environmental cohesion, cross-border cooperation, Hungary, Croatia

ON THE POSSIBILITY OF EXTENDING THE EUROPEAN GREEN BELT TO THE BULGARIAN-ROMANIAN BORDER REGION

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Europe is highly committed to nature conservation and sustainable development. One of the most remarkable initiatives meant to achieve these goals is the European Green Belt, an area that connects national parks, nature parks, biosphere reserves, transboundary protected areas and non-protected valuable habitats along or across the former Iron Curtain. In case of a positive scenario, in the near future Europe will have to accept the expansion of the Schengen Area. This means that in a not too far future there will be a possibility to expand the European Green Belt by the Bulgarian-Romanian border-region. This consists almost entirely of the Danube, with agricultural land on both sides. The River has in this region several major and smaller affluents, a considerable number of lakes in its vicinity and a great number of Natura2000 areas, therefore it has a remarkable potential to develop local and regional tourism.

In our paper we make an attempt to put together relevant information about the natural and environmental characteristics, as well as the economic and infrastructural framework of the region. We try to outline a blueprint of a greenway plan for the border area, in order to create more opportunities for the sustainable development of the region through the green belt development. The main questions we try to answer through our analysis are, as follows:

could the existing Natura 2000 areas in the area constitute the emerging points of a quasi-continuous linear green corridor?

by what means could the unused agricultural terrains in the border region be transformed into components of a green corridor?

in what extent could the existing environmental and economic planning experience in the area be used in developing a master plan of a green corridor, with special regards to the Bulgaria-Romania Cross-Border Co-operation Programme 2007–2013?

Key words: European Green Belt, Bulgaria, Romania

GLOBAL ENVIRONMENTAL CHANGE RESEARCH IN THE LOWER DANUBE BASIN – COLLABORATIVE PERSPECTIVES

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Transdisciplinary and crossdisciplinary researches are at the core of the EU Strategy for the Danube Region. It is within the scope of the Strategy as well as of the international program Future Earth to undertake integrative approaches towards sustainability through coherent and coordinated researches and knowledge-based processes. Within this context, a collaboration network for the Danube basin has been initiated in view of the development of a digital Global Change Atlas of the Danube Region (GLOCAD), having been functioning over the last three years. The network builds around the issue of water-food-energy nexus, with a focus on water and land resources use in the whole Danube basin under the context global environmental change. Formed of nine institutes from six Danube countries, the GLOCAD network gathers scientists from various disciplines, specifically from hydrology, geomorphology, soil and environmental sciences, agriculture economists, computer scientists, etc. The present talk will cover specific topics concerning the lower Danube basin challenges of climate change impacts, societal transformations and regional disparities between upper and lower Danube basin development pathways. Potential collaboration opportunities and improvements of the cooperation between institutions across the Danube region will be emphasized in the concluding remarks.

Key words: lower Danube, potential collaboration, transdisciplinarity

TERRITORIAL DISPARITIES IN THE DEVELOPMENT OF ROMANIA'S BORDER AREAS. EU VS. NON-EU

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The border areas of Romania include 898 Local Administrative Units 2 (LAU2), of which 88 are urban. Romania has border line with the following countries: Bulgaria, Republic of Moldova, Serbia, Ukraine and Hungary, 63.5% of which is Non-European Union boundary.

The current paper is seeking to indentify territorial disparities in terms of development in the Romania's border areas following several research stages: to select relevant statistical indicators, to analyze their territorial disparities, to standardise the absolute values of the selected 15 indicators; to group the elementary indicators using three secondary indexes (competitiveness, cohesion and sustainable development) and to stress out the main socio-economic development aspects: 1 – *competitiveness* (general employment rate, unemployment rate, number of higher education graduates/total population over 20 years old, variation rate in the number of employed population between 2002 – 2012, physiological density); 2 – *territorial cohesion* (population migration rate, average rate of population growth, total population, dynamic of finished dwellings (1990 – 2014), living floor m2/inhabitant; the demographic dependency index, the physicians/1,000 inhabitants); 3 – *sustainable development* (% of dwellings with access to sewerage system, forest-covered area, green space area/inhabitant, the consumption of natural gas for domestic use).

Based on the above specified methodology, the authors developed a final index of territorial development using the relative distances ranking method, adapted to the objective of the current study, in order to measure simultaneously the territorial disparities between the LAU2 of the Romania's border areas and between each border areas and EU vs. Non-EU.

Key-words: territorial development, border areas, EU and Non-EU, Romania

GEOMORPHOLOGICAL STUDY OF GJUMJURDZHINSKI SNEZHNIK RIDGE (PAPIKIO OROS/KARLAL DAĞI), EASTERN RHODOPES MTS.

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The border territory of Bulgaria is poorly studied and this is the reason Gjumjurdzhinski Snezhnik Ridge to be out of the range of specialized Bulgarian research up to now. There are only few publications which comment wider areas regarding the geology and the physiography of the Eastern Rhodopes and suggest four preserved levels associated with the neotectonic activity and planation. Specialized geomorphological study has never been taken in this area.

In the paper are resumed results from morphometric analysis in order to determine the exact extent of the mountain structure, which was disputable in the different sources. On the field are described and characterized representative conditions for rock weathering, slope movements and erosion. We used grain size analysis to distinguish different kinds of deposits and suggest if they are formed in situ or transferred from upper levels.

Based on these first results the exact range of Gjumjurdzhinski Snezhnik Ridge was specified and local statement of environmental processes is determined. They are compared with other mountain areas in Bulgaria in order to define vertical zonal distribution of landforms and nature complexes.

Key words: morphometry, geomorphological processes, grain size analysis of deposits, Gjumjurdzhinski Snezhnik Ridge

CHOROLOGY OF VULNERABLE BRYOPHYTES SPECIES FROM THE REPUBLIC OF MOLDOVA

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The forests of the Republic of Moldova, by their ecological characteristics and the fact that a large part of them are protected areas, serve as habitats for optimal growth and development of different species of bryophytes. In order to identify areas of growth and development of rare bryophytes, included in various editions of the Red Book of Moldova (1978, 2001, 2015), we researched the main forest and forest-rocky ecosystems from various regions of our country' natural areas (years 2000–2015), these being compared with data of previous research in this area (years 1972–2006).

The study indicated that between the seven rare species of mosses, included in the new edition of the Red Book of Moldova (2015), one species (Climacium dendroides) is at the Southern limit of its spreading areal and prefers moist habitats of deciduous forests; species (Ditrichum flexicaule) - mesophyte and (Weisia fallax) – xerophyte, prefer habitats of rocky forests, limestone cliffs from Prut River and Dniester River; two other species (Cirriphyllum piliferum, Thuidium delicatulum) – prefer as habitat the dry forest' phytocenosis and species (Orthotrichum patens, Neckera pennata) – the wet forests' phytocoenosis of Moldova. For some rare species of mosses, indicated for the first time in six new places of Moldova, it is necessary to take under state protection these habitats, through their transformation into natural areas that protect directly the referred mosses species.

Key words: bryophytes, chorology, Red Book, ecosystems, habitats

A KINEMATIC MODEL OF SEISMIC EARLY WARNING SYSTEM FROM VRANCEA DEEP EARTHQUAKE SOURCE

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The seismic early warning systems (SEWS) are the product of the last and most modern achievements of the recent practical Earth's science. Heavy earthquakes occurred in Japan (2011), Sumatra (2004), Chile (2010), Nepal (2015), etc. generated huge damages and human deaths. These earthquakes demonstrated the need of such systems. All known kinematics' SEWS are based on the fundamental physical property of the seismic waves propagation: the P-waves (with lower amplitudes and smaller destructive potential) travel approximately 1.71 times faster than the S waves (with several times larger amplitudes and much more destructive potential due to the medium particles movement perpendicular to the wave ray propagation). Up to now – only Japan has fully operative and effective SEWS introduced in operation in 2007. Its efficiency was demonstrated during the M9 earthquake on 11th March, 2011. The kinematic models have been developed for Vrancea deep seismic source considering the distances between it and many Bulgarian cities. This model calculated the travel times of P and S waves, using the well known and calibrated curves of Jefreys-Bullen tables. The first arrivals of the P-waves (called "signaling") and the S-waves arrivals (called "destructive") used the direct seismic wave's phases. The time differences Ts-Tp (called "warning") are also modeled for all Bulgarian cities threaten by the Vrancea earthquakes. The experience of the 1977 M7.4 earthquake, which damaged many cities in Bulgaria is also considered. The fixed seismic source can be represented as a point due to its relatively small area dimensions. Thus the calculations are easily simplified and give very good and reasonable results. The results show that if a special methodology is followed – then the seismic signal generated could be very fast disseminated to all interested institutions – Civil Defense authorities, decision makers and population. The results of these models are under investigations and discussion.

Key words: Model, Early warnings, Earthquakes, Vrancea

GEOECOLOGICAL EVALUATION OF THE AREA OF SPECIAL NATURE RESERVE "STARI BEGEJ - CARSKA BARA", SERBIA

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The aim of the geoecological evaluation of the Special Nature Reserve "Stari Begej – Carska Bara" and its protected zone is how to develop the area of the Reserve and its surroundings. Considering the fact that this area has the potential for nautical, sports and recreational tourism (walking, cycling and boating), cultural, educational and rural tourism, the task of this paper is to assess the level of value and profitability of investment in improvement of these forms of tourism on this territory. This area is geoecologicaly evaluated by using the recreation potential indexing method. Evaluation confirmed that this area has a natural predisposition for the development of tourism and recreational activities such as hiking, biking, sightseeing and excursion tourism.

The area of Special Nature Reserve "Stari Begej – Carska Bara" through valuation received the highest rating (10) for purposes of education, recreation and picnic tourism and falls into the category of the "most valuable" parts of the area. The results showed that the flow of the Stari Begej river is not suitable for activities related to nautical tourism, and also it have been identified that all the settlements beyond the protected zone of the reserve area, mainly Belo Blato and Perlez, are suitable for the development of rural tourism.

Key words: geoecology, evaluation, Special Nature Reserve "Stari Begej – Carska Bara", tourism, Serbia

RECONSTRUCTING THE RECENT EVOLUTION OF THE PRUT RIVER CHANNEL IN IAŞI COUNTY SECTOR (NE ROMANIA) USING CARTOGRAPHIC, REMOTE SENSING AND GPS DATA

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Representing a direct response of hydrologic, hydrogeologic and geomorphologic factors, the dynamic of the river channels has a useful scientific and practical importance. The practical aspect was often emphasized in the literature especially for the regions where the rivers play the role of state borders. The Prut River has meandering channel along the Eastern Romanian border with Republic of Moldova, including the sector corresponding to Iasi County: an alternation of sectors which have recorded intense processes of erosion followed by those with accumulation.

Using a large series of cartographic, remote sensing (RS) and Global Positioning System (GPS) data in a georeferenced environment, this paper presents a detailed map of the dynamic of the Prut River channel for the last 120 years for a sector with a length of more than 100 km. The work consisted in digitization of these spatial data archive using various topographic maps (1893-1894 edition at 1/50,000 scale, 1940 edition at 1/20,000 scale, the 1960 and 1984 editions at 1/25,000 scale), the 1964 and 1984 editions at 1/5,000 scale), SPOT and LANDSAT images for the 1990 and 2000 decades, LIDAR DEM high spatial resolution (for the year 2013), and Google Earth® high resolution optical satellite images collection. For the last two years, the channel dynamic was validated and completed by GPS measurements, carried out in the Prisăcani sector (cca. 20 km length) of the Prut River.

The identification of these geomorphological hotspots, especially those characterized by intense erosion and attempts to determine the rates of the river bank retreat, represents milestones for hydro-geomorphological analyses, land use planners, administrative stakeholders and frontier managers and border police.

Key words: Erosion, Prut River, meandering, remote sensing, GIS

IMPORTANCE OF IBAS, IPAS AND PBAS FOR PROCESS OF NATURE CONSERVATION HARMONIZATION IN CROSS-BORDER REGIONS WITHIN THE LOWER BASIN OF THE DANUBE

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The concept of designation of ecologically important areas such as Important Bird Areas (IBAs), Important Plant Areas (IPAs) and Prime Buterfly Areas (PBAs) is based on the identification of key attributes of conservation concern and is a distinct azonal approach to reserve selection. This paper aims to identify significance of the IBAs, IPAs and PBAs in cross-border area between Serbia, Bulgaria and Romania where conservation efforts should be focused as a matter of urgency and successful cooperation in complex nature conservation process. Taking into account the standardized methodology for designation of these international ecologically important areas, will be analyzed their recent status in relation to identified threats, factors of endangering, and based on them adequate management procedures. As these areas do not necessarily have to be legally designated, instead they could provide a framework to assess and support existing conservation programmes such as national protected area networks, the EU Natura 2000 network, the Bern Convention and Emerald Network, PEBLDS and PEEN, and the Ramsar Convention by providing up to date, easily accessible data about threatened species of birds, plants and butterflies and their habitats. Due to the precisely defined quantitative criteria relating to the complex status of species in focus for protection at different spatial scales (global, regional, sub-regional, etc.), such approach to the nature protection is need to be used for harmonization and the mitigation of existing differences in the concepts of nature protection between EU member countries (e.g. Bulgaria and Romania) and non-EU countries (e.g. Serbia).

Key words: nature conservation, azonal approach, threatened species, habitats

THE PRESENCE OF SOME SPECIES IN THE FAMILY TRICHONISCIDAE SARS, 1899 (ISOPODA, ONISCIDEA) AS A BIOINDICATOR OF CALCIUM IN THE ENVIRONMENT, PRELIMINARY RESULTS

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A variety of organisms are used as bioindicators of environmental pollution. Knowing their characteristics, many of them can become bioindicators in other scientific research. Given that terrestrial Isopoda (suborder Oniscidea) represent a group of crustaceans, they need the chemical element calcium (Ca) for normal functioning of physiological processes, above all for periodically changing exoskeleton. It is known that the low mobillity of the representatives of the family Trichoniscidae Sars, 1899 make them totally dependent on the presence of calcium in their immediate environment. In the area of the Pivarov stream valley (Fruška gora mountain, Serbia) researches investigated the presence and abundance of populations of two species of the aforementioned family and Stylohylea bosniensis, as potential bioindicators of the presence of calcium in the habitat. Stream flows through deciduous forest of beech, hornbeam and linden. From its spring to its confluence with the Novoselski creek, at two positions flows through the limestone rocks which constitute the base of the riverbed. Other environmental factors essential to the existence of terrestrial Isopoda are homogeneous over the stream valley. At both sites where limestone is present in the substrate, populations of both species types are numerous. Directly below the limestone-rich localities number of individuals in a population is significantly reduced, further downstream representatives of both species completely disappeared. Curiosity is the fact that several tens of meters above the limestone areas, representatives of both species are not found, while at the limestone areas their populations are very numerous. These preliminary results lead us to conclude that some of the less mobile Isopoda representatives of the family Trichoniscidae may represent good bioindicators for the presence of calcium in their habitat and may be the bioinicators for a preliminary geological research in environmental presence of limestone.

Key words: bioindicators, calcium, limestone, Fruška Gora moutain, Serbia

DATA ANALISYS OF WAHASTRAT MONITORING SYSTEM– TYPOLOGY, ACQUISITION AND DATA INTEROPERABILITY (FROM DATA TO INFORMATION)

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Conduct a complex research to determine the most important water shortage related conflicts, to measure and monitor drought events was the primary objective of the WAHASTRAT project.Based on WAHASTRAT system of automatic monitoring stations (WH1 to WH8), data series of environment variables were generated: soil moisture, speed and wind direction, air temperature,air humidity andatmospheric precipitation. Whereby the moisture content in the soil describes the 6 measured values each distributed to 10 cm vertically. Typology of data is real scalarin floating point format, for all monitored environment variables, except for the moisture content in the soil, which is represented by a vector of real-type. Data is stored after acquisition (local buffer of maximum 2 11 addressable location 10bit data) at intervals of 1 hour, sentwith GPRS-a, the point of concentration is carried out transformation in the relational model. Web servis, based on the data in a relational database, allows expressive visualizationin tabular form series of two-dimensional model. Both forms of expressive renderings are suitable for data interpretation, its bringing into context, understanding of the information and decision-making. In order to achieve interoperabilityand data exchange it is providedexportin CSV andXSL formatas well asXML based WEB servis. As we used WH2 station as a characteristic data providing system of WAHASTRAT data, we can say that the acquisition is initiated with the date 2013-12-09. in 6:20:08 until the day of observation 2016-03-10 in 8:18:59 it's collected 238390records of individual sensor reports. At the day the series is continuous except for dates 2015-03-24, 2015-03-17, 2014-06-27, 2014-06-26. Specific characteristics of the data: mean from 0.55 to 99.23, standard deviation 0 to 189, trimmed mean (with trim defaulting to .1) 0 to 203.82, median (standard or interpolated) 0 to 136.4, kurtosis -1.36 to 762.6 and standard error from 0 to 0.11. Data series is consistent and proved for connectivity research of environmental variables.

Key words: data analisys, environmental variables, WAHASTRAT, Serbia

CONSERVATION AND RESTORATION OF VEGETATION AND HABITATS THROUGH THE MANAGEMENT PLAN OF MANAGED RESERVE „IBISHA"

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Vegetation and habitat diversity in managed reserve „Ibisha" was analyzed with aim to develop measures for their protection, maintenance and restoration. Managed reserve"Ibisha"occupies part of the Tsibar island, located on Bulgarian part of Danube River.

In floristic method for classification are established plant communities that are related to the following classes: Class Salicetea purpurea Moor 1958; Class Bidentetea tripartitae Tx. et al. ex von Rochow 1951; Class Isoeto-Nanojuncetea Br.-Bl. et Tx. ex Westh. et al. 1946.

There are identified serial forest communities related to secondary succession of vegetation in the natural habitat from Annex № I of Directive 92/43/EEC 91E0* Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnioninc anae, Salicionalbae) - subtype Salicion albae.

There are identified and serial grass communities in coastal areas, related to natural habitats from Annex № I of Directive 92/43/EEC-3270 Rivers with muddy banks with Chenopodion rubri and Bidention p.p.and with 3130 Oligotrophic to mesotrophic standing waters with vegetation of the Isoeto-Nanojuncetea.

In the Red Data Book of Bulgaria in the category „Endangered" (EN) are included formed Riparian willow-poplar forests, muddy riverbanks with semi-ruderal communities of high annual hygrophytes and silty and sandy riverbanks with communities from lower annual hygrophytes.

Measures to control invasive species in plant communities and for restoration of the conservation status of habitats in the managed reserve have been developed.The measures are included in the Management Plan of the managed reserve, developed in 2015.

Key words: Vegetation, Habitats, Managed reserve, Tsibar Island, Management plan

PROFILE OF THE FLOOD RISK IN THE DANUBE FLOODPLAIN – DOLJ AREA (ROMANIA)

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Flood risk emerges from the interaction of hazard and vulnerability. The focus of this paper is on damaging floods. The starting point is the correlation between the national and international research background and legislative framework, which the authors use to create the flood risk profile for the Danube floodplain - Dolj area. The research is conducted ten years after the historical floods occurred in April-May 2006.

The subject is important and actual, as floods have an increasing trend, while their correct evaluation is still extremely difficult and vulnerability of elements at risk is more and more emphasized.

As the study area is profoundly rural, with extended agricultural terrains and almost no industry, people and cultivated land or agricultural assets are the most important elements at risk. This research explores the statistic and spatial dynamics of the elements at risk, underlining how they may be adapted to address processes of uncertain future change.

The statistical analysis was conducted on nineteen territorial administrative units (including three towns) partially overlapping the Danube Floodplain. The indicators are based on available data from the National Institute of Statistics. The digital imagery and tools provided by Google Earth Pro enabled the spatial evaluation and analysis of the land use and land cover changes occurred during the last decade. The 2016 field work confirms the results of the research and brings interesting insight on the human pressure on the environment and social vulnerability to flood hazards.

We identified certain levels at which change may be integrated in decision making: in the representation of uncertain non-stationary quantities, in the variety of options that may be contemplated for flood risk management and in the social and organizational characteristics that promote adaptive capacity. Integrated responses to changing flood risk need to attend to each of these levels of decision making to the promotion of resilient communities.

Key words: flood hazard, flood risk, social vulnerability, Danube floodplain

PRELIMINARY ASSESSMENT OF THE ECOLOGICAL HAZARD FOR HEAVY METAL AND ARSENIC POLLUTION OF THE LOWER DANUBE LOWLANDS

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Certain loads of heavy metals and metalloids are transported with the particulate matter of the Danube River downstream in its lower basin. Deposition of river sediment in the floodplain during flood events may pose a certain risk for pollution of the lowlands along the Lower Danube. In order to assess the hazard of contamination, the content of Cu, Pb, Zn, Ni, Co, Cr and As has been studied in the fine sediment deposited in the Bulgarian section of the Danube floodplain at high river stages in the spring and summer of 2013. The hazard is assessed for each of the lowlands on both sides of the Danube between the Timok River's confluence and the town of Silistra. The assessment considered the US EPA standards for sediment of freshwater ecosystems. The concentrations of most of the studied microelements tend to peak in the western part of the Lower Danube and decrease eastwards to the town of Silistra. Copper is the element with the highest excess over the US EPA standards and the European background level for stream sediment. It turns to be the main thread regarding the soil contamination of the Lower Danube floodplain, especially for the lowlands lying close to the mouth of the Timok River. The highest hazard rates are calculated for the lowlands in the western part of the study area and this fact should be considered when wetland restoration activities are planned and executed.

Key words: Danube, hazard assessment, heavy metals, arsenic, flood sediment

THE MEDITERRANEAN OSCILLATION (MOI) AND THE FOREST FIRES IN ROMANIA IN THE PERIOD 1986-2014

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The study examines the connection between the Mediterranean Oscillation (MOI) and the forest fires (the annual number of fires, the annual burned area and the average burned area per fire) in Romania in the period 1986-2014. Pearson's correlation coefficient (R) was used for determination of the correlation connection. Two MOI datasets were used: MOI-1 (Algiers and Cairo) and MOI-2 (Israel and Gibraltar). Monthly, seasonal and annual values of MOI were used in the calculations. Results for the number of fires and MOI-1: the highest values of R (statistically significant at the level of $p \leq 0.05$) were obtained for April (-0.446) and June (0.423), and for summer (0.432). The annual burned area and MOI-1: the highest values of R (statistically significant at the level of $p \leq 0.05$) were obtained for April (-0.459), and for winter (0.406). The number of fires and MOI-2: the highest values of R (statistically significant at the level of $p \leq 0.01$) were obtained for June (0.556) and February (0.475), and for summer (0.507). The annual burned area and MOI-2: the highest values of R (statistically significant at the level of $p \leq 0.05$) were obtained for June (0.449) and February (0.439), and for summer (0.439). Results of the research could be used for the long-term forecast of forest fires in Romania. However, further investigations of the connection between forest fires and other climate indices are necessary.

Key words: Mediterranean Oscillation, forest fires, burned area, Romania

TWO EXAMPLES OF MODERN LANDSLIDE ACTIVITY IN SOUTHWEST BULGARIA

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Detail description of the landslide morphology of two modern landslides in South West Bulgaria has been given. An attempt for classification of the types of landslide deformations, with relation to lithology and existing fault systems is made. A pictures with type of deformation related with the different destruction areas,as well as the main landslide's elements are presented. During the field researches to collect verbal information, about the starting point and the age of the destructive process, meetings with local inhabitants are made. As a risk manage tool a system for real time warning is presented.

Key Words: Landslides, modern tectonics movements, hazards and risks

EXTREME PRECIPITATION IN PROVADIYSKA RIVER BASIN (NORTHEASTERN BULGARIA) FOR THE PERIOD 1994–2008

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Extreme precipitation, falling on a small geographical area, often has a negative effect leading to a sharp increase in water levels in rivers and dry valleys, and settlements, flooding agricultural land, causing problems in transport and infrastructure, intensive erosion-accumulative processes, activation of landslides, etc. The upward tendency of damages caused by natural disasters supports the idea that extreme events, associated with the effects of climate change, have occurred with greater frequency recently. The series of hazardous precipitation events which affected the Balkans, Bulgaria in particular in 2005 and 2007 show that additional investigation of such type of phenomena is necessary so that they can be predicted more precisely.

The paper presents the results from an investigation of the extreme precipitation in Provadiyska river basin for the 15-year period. The basin is situated in the eastern part of Danube plain (Bulgaria).

5 daily rainfall categories have been analyzed (as percentage of the total annual amounts) as follows: light (A) 0.0-4.9 mm; light-moderate (B) 5.0-14.9 mm; moderate-heavy (C1) 15.0-29.9 mm; heavy (C2) 30.0-59.9 mm and torrential (D) 60.0 mm and above. The increase in rainfall from groups C2 and D even in individual stations against the emerging trend towards drought in the country would increase the risk of local flooding, increased soil erosion and activation of landslides in the catchment area.

Preventive measures that can be taken for the protection of emergency after intensive rainfalls are: regular cleaning of river beds, proper management of dams and avoidance of construction of buildings, facilities, industrial, agricultural and other buildings in the floodplain terraces in the river valleys.

Key words: Provadiyska river basin, extreme precipitation, daily rainfall categories, prevention

PRESSURE AND RELEASE AND SWISS CHEESE: A COMPARISON OF DISASTER MODELS FOR FLOOD AREAS ALONG THE LOWER DANUBE RIVER

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The complex interactions between risk, vulnerability, and hazards, which lead to disasters, can be understood in competing ways. In this mixed methods research we compare two disaster models: the Pressure And Release (PAR) model, and the Swiss cheese model. Data were collected in four villages in the Lower Danube area of Romania and include both questionnaire items and in-depth, anthropological, insights. Specific interest was given to the flood hazard relevant for the area. The PAR model underlies, though seldom explicitly stated, most disaster studies which focus on natural hazards. The Swiss cheese model is born, and would seem to best explain, technological disasters. The aim here is then to observe the upside and limits of both models given the same data. While the PAR model has deserved merit when employed to understand the complex system surrounding disasters, we find instances where the more technical alternative model can streamline efforts for resilience building, in communities exposed to flood hazards.

Key words: Pressure and Release model, Swiss cheese model, Disaster models, Flooding, Danube

INTEGRATING LAND USE /COVER ASSESSMENT AND FLOOD RISK MANAGEMENT IN BURGAS REGION, BULGARIA

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Reliable and consistent land use/ cover information is needed to be integrated properly in flood risk management and land use planning. It is useful also for resource management decisions and future assessment of the status and trends of landscape. Consistent data provided by remote sensing with high temporal and spatial accuracy can be efficiently applied by powerful GIS tools for sets the targets and measures for mitigation of the damage flood risk. These measures should be based on analysis and assessment of spatial distribution of land cover and land use. The initial land use/cover data were obtained by computer aided visual interpretation of satellite images in GIS environment within the framework of the CORINE Land Cover 2012 – Bulgaria project. We have developed more detailed land use/ cover data and maps using orthophoto images of the Burgas region for selected Areas of Potential Significant Flood Risk (APSFR), which have been determinated according to the Directive 2007/60/EC and have been presented on the flood hazard and flood risk maps of the Black Sea River Basin. An analysis of the driving forces of increasing risk and the disastrous consequences in new urban development in regions designated as APSFR is performed. Some recommendations regarding preventive actions and regulation of the spatial planning that could be undertaken to decrease the flood hazard in region under study are outlined.

Key words: GIS, land cover; land use, flood hazard and risk, Burgas region

FROM RESOURCES TO SERVICES – MAPPING PROVISIONING ECOSYSTEM SERVICES IN THE DANUBE PLAIN (VIDIN REGION)

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In the last years the sustainable use of natural resources draws more and more attention of both the scientific and practical research initiatives and becomes a "hot topic" in the regional planning efforts worldwide. Depending on constraints defined by the social and political settings, the availability of and the preferences for the natural capital provision differ in spatial and temporal scales. There is a growing demand of high-quality landscapes which provide more functions and are able to stay ecologically resilient to various natural and human-driven hazards. Also, the spatially-explicit use of the ecosystem services concept opens up the space for the application of a transdisciplinary approach for the integration of the scientific knowledge to the practical initiatives.

Based on their structure and functions, different landscapes have different potential to ensure resources regarding the social wellbeing. The provision of flows of stocks and services is tightly linked to the capacity of the ecosystem. An ecosystem functions is defined like "service" only when there are people who can benefit of it. This paper demonstrates the application of a biophysical mapping of quantitative indicators that convey information about the flows of provisioning services to the territory of the Danube plain within Vidin region. The mapping methodology goes beyond the land cover, since it collects information of the landscape components and is based on a landscape unit scale. The biophysical data provides robust information on the current state of the ecosystem services and the results show the capacity of each landscape unit to provide ecosystem services. Further application of mapping approach in assisting the communication and the process of decision making in the relevant policy measures is also discussed.

Key words: ecosystem services, landscape units, mapping, regional management, natural resources

CLIMATE CHANGE AND ASSESSMENT OF RISKY BIOCLIMATIC PHENOMENA

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Hot waves, cold spells and other climatic extremities are phenomena occurring more and more often recently. Their dangerous influence on the human heat comfort and health require careful study of such occurrences in seeking of a problem resolve.

The aim of this work is to present a system of approaches for an assessment of the extent to which the unfavourable climatic phenomena may affect the heat comfort of a human organism. The work is based on the case study of Lom locality along the Danube.

The results can be useful for a better understanding and study of the human heat stress nature ant its assessment. Together with this the work gives a model for assessment of the risky heat phenomena and a corresponding planning of more adequate response to them.

Key words: risky bioclimatic phenomena; heat and cold stress; assessment; Lom locality along the Danube

USE OF THE UNMANNED AERIAL SYSTEMS IN CONDITIONS OF CRISIS SITUATIONS

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The report presents the author's experience in the use of Unmanned Aerial Systems (UAS) in the management of natural and technogenic crisis situations. An attempt to outline the guidelines for the use of this type of technical means as an element of remote monitoring for acquiring spatial information. Attention is paid to issues related to: legitimate use of drones in domestic air spaces; necessary structure and equipment of the UAS; preparation and execution of mission for video surveillance in real time or orthophoto shooting as method for "fastmapping"; analysis of the information received and preparation of reports to assist in the decision making process in crisis management.

Key words: Unmanned Aerial System, crisis situation, decision making

ESTIMATION OF FLOOD EXTREMES IN THE SERBIAN PART OF THE DANUBE

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In this article, the water regime and the estimation of flood waves were analyzed for four hydrological stations within the Serbian part of the Danube River. Water regime analysis was done with values of average, minimum and maximum discharges between 1961 and 2014. By means of probability theory and mathematical statistics, analyses of time series of maximum discharges were made and the theoretical functions of the distribution of high water occurrence were obtained. Based on this data estimation of flood extremes was calculated.

In the next part of article, annual and monthly temporal distribution of flood extremes is analyzed. For annual analysis maximal discharges before and after the construction of Iron Gates dams were compared. Analyses on a monthly level showed that the flood extremes occur mostly in late spring or early summer. The results obtained can be applied for improvement of flood defense measures.

Key words: water regime, discharges, flood extremes, Serbia part of the Danube

LOW-FLOW PERIOD SEPARATION OF DANUBE TRIBUTARIES IN BULGARIA FOR A DRY AND A WET YEAR

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A stream's low-flow period is an important component of its flow regime and affects the temperature of the water, the concentration of various substances, the amount of oxygen dissolved, the water consumption, etc. Studies of the low-flow are challenged in theoretical hydrology as well.

This study investigates the low stream flow period's separation in hydrological aspect carried out by two methods. The subject is the Danube tributaries' stream flow in the mouth of the river for 2001 in Bulgaria – the driest year for the period 2000 – 2014, and 2005 – the wettest year for the same period. The daily discharge data have been used for the analysis. Both the threshold level method (50% percentile) and the Base Flow Index (which is measured by the local minimum method) are used for the isolation of continuous low-flow events. The study accepts that the low water period must last at least ten days to be classified as such. Three categories for low water period were used: short low water period (10 – 20 days), medium low flow period (21 – 30 days) and long low water period (above 30 days).

Results show several low water periods for every drainage basin in both the driest and the wettest year for 2000 – 2014. Predominant short low-flow periods are isolated by Base Flow Index in both years. Long low-flow periods are an exception. Most of these periods appear in the summer. Another result is obtained by applying the threshold level method. When it's used, it shows that long low-flow periods are common. Lowest stream flow occurs during the winter and the summer of 2001 and during the winter and the spring of 2005.

Of the two, the threshold method gives more realistic idea about the low flow period. The study provides solid ground for further research of the low-flow periods in theoretical hydrology.

Key words: low-flow period, Danube tributaries, dry year, wet year

PRECIPITATION PROJECTIONS FOR THE 21ST CENTURY OVER THE CARPATHIAN BASIN

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Global climate change means an urgent and serious challenge for our society. The development and implementation of specific climate strategies may significantly contribute to the mitigation and adaptation to the local effects.

An essential step towards the adaptation in Hungary is the Adaptation to Climate Change Programme funded by the Grants of European Economic Area. In framework of the programme a National Adaptation Geo-information System (NAGiS) has been developed since 2013 to support the strategic planning. The database provides countrywide information about climate change and its impacts on different sectors with indicators and analysis methodology for vulnerability assessments. The current impact studies are focussing mainly on water management (drinking water, ground water, Lake Balaton) and biodiversity issues.

The RCMGiS project entitled "New climate scenarios based on radiative forcing change over the Carpathian Basin" served proper scientific meteorological information on future climate change to NAGiS. In the project new climate simulations were performed on 10 km horizontal resolution using the recent versions of ALADIN-Climate and RegCM regional climate models adapted at the Hungarian Meteorological Service and at the Eötvös Loránd University, respectively. After sensitivity studies to find the optimal model settings, longer historical runs were conducted to test the models for a past period. Then climate projections were run and to account for the potential impacts of human activities, new RCP scenarios were taken: the "pessimistic" RCP8.5 and the "optimistic" RCP4.5. Future changes were quantified for 2021–2050 and 2071–2100 relative to the reference period of 1971–2000.

The presentation aims at introducing briefly the NAGiS system, with main focus on RCMGiS project. The precipitation projections of ALADIN-Climate are going to be detailed for Hungary and an outlook will be also given for possible extension and development of the system.

Key words: vulnerability, future projections, Carpathian Basin, ALADIN-Climate, water management

CLIMATE CHANGE AND DROUGHT IMPACTS IN THE CARPATHIAN BASIN

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Climate change and drought strongly affect the Carpathian Basin having clearly observed complex environmental impacts in the last decades. Climate change impacts and the observed environmental impacts contribute to increasing rate and frequency of drought, causing social, economic, and environmental problems. The problems are mostly related to the changing hydrological conditions. The lack of water during drought periods is harmful to all living organisms and results in reductions in agricultural yields. The long-term changes in water resources are an important indicator of climate trends and human impacts. The drier period from the beginning of the 1980s caused significant decline of groundwater resources mainly in the Danube-Tisza Interfluve. Low-water periods became more frequent and decreasing discharge values are detected for lowland Hungarian rivers. The vegetation response to climate change and drought years was also assessed. The reduction of biodiversity and wetland habitats, and the transformation of habitats, moreover in drought years decreased vegetation intensity and serious yield loss were observed. By highlighting critical drought hazard areas and the connections between hydrological conditions and vegetation response results are useful for spatial and landscape planning or land and water management to better adapt on the increasing drought hazards affecting the land functioning e.g. in primary production, habitat qualities etc.

According to regional climate model simulations, Carpathian Basin will be exposed to increasing drought hazard, which will make this hazard probably the most serious hazard of the region. Furthermore, because of the projected increase in climatic extremes, high fluctuation of the hazards can be expected. Therefore, the development of sustainable and resource water management, and a monitoring or early warning system that provides real-time information on agricultural and hydrological aspects at the local or county level would be highly welcomed in this region.

Key words: drought impacts, water resources, vegetation response, monitoring

CHANGES IN HEAT WAVES INDICES IN SOUTHERN ROMANIA

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Among the weather events generated by extreme temperatures, heat waves are some of the most harmful. They are often associated with numerous disasters such as human health, and mortality, water quality, and engineered systems, and their secondary effects on society. The main objective of this study was to detect and analyze changes in heat waves in Southern Romania over a 55-yr period (1961–2015). They were defined based on both daily maximum and minimum air temperature recorded in 11 weather stations during the extended 5-months summer (May-Sept) using the set of indices recommended by ET-SCI. Similar multi-angle investigations of heat waves haven't been done up to now for Romania. Three heat waves definitions were considered: at least three consecutive days when maximum temperature is greater than 90th percentile, at least three consecutive days when minimum temperature is greater than 90th percentile, at least three consecutive days when Excess Heat Factor is greater than 0. Three reference periods were used to calculate the percentile values (1961–1990, 1971–2000, and 1981–2010). Five parameters of heat waves were investigated: heat wave number, cumulative duration, the longest yearly event, the magnitude, and amplitude. Trends were computed using ordinary least square (OLS) and t-test methods at a statistical significance threshold of 5% (p-value is less than 0.05). Our study reveals a remarkable increase in almost all parameters no matter what definitions we considered over May-Sept period. While the impact of heat waves on natural environment and human society may also increase, our results can add a significant contribution in determining adaptation strategies for mitigation the impact of such events.

Key words: heat wave, ordinary least square method, t-test, climate change, Southern Romania

OUTDOOR HUMAN THERMAL COMFORT IN THE CITY OF NOVI SAD (SERBIA)

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Urban climate monitoring system (UCMS) was established in Novi Sad (Serbia) in 2014 with air temperature (Ta) and relative humidity (RH) sensors deployed on 27 locations in city and its surroundings. Thermal comfort of humans was assssed by using Physiologically Equivalent Temperature (PET) thermal comfort index calculations during heat wave (HW) period. Comfortable and uncomfortable outdoor areas in Novi Sad were detected and thermal comfort differences were quantified.

The highest thermal loads are present in the open midrise local climate zone (LCZ) of the city during the daytime. In nighttime hours, highest PET values are present in compact midrise LCZ. The most comfortable area is dense trees LCZ north of the city. Thermal comfort differences between all LCZs are statistically significant during the nighttime and more pronounced (up to 6.9 °C) than at daytime (up to 3.9 °C).

Calculated values of human thermal comfort indices can provide urban planners and architects in the city of Novi Sad the opportunity to propose and design comfortable areas of the city in order to mitigate the negative effects of urban climate and expected climate change.

Key words: urban climate monitoring system, outdoor thermal comfort, PET, local climate zone, Novi Sad

PRELIMINARY CHARACTERIZATION OF KARST WATER REGIME IN THE DANUBE RIVER CATCHMENT AREA AT THE BULGARIAN TERRITORY

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The main goal of this study is to explain the role of karst water in the formation of groundwater flow of the Danube tributaries on Bulgarian territory and the runoff of larger karst springs in the river watershed. The studied area covers the region between the Danube River and the main Balkan ridge (Stara Planina mountain), which is a major watershed separating the Black Sea and the Aegean catchment areas. The eastern border of the region is the watershed between the Danube River and the Black Sea. In geological terms, the studied area is located on the Moesian Platform and its southern parts cover the structural elements that constitute the Fore-Balkan and the Balkan on which surface there are outcrops of rocks that vary by type and age. Some of them provide favourable conditions for karst water formation. These are limestones and dolomites of Sarmatian, Senonian, Lower Cretaceous, Upper Jurassic, and Triassic age. In the North, they form discrete aquifers that gradually sink in depth and are of the plate karst type, while the southern part is characterized by the typical mountain basin karst and the Fore-Balkan karst types. The aquifers are drained by springs and all of the important ones are included in the Bulgarian National Groundwater Monitoring Network. This allows the study to analyze the changes in their water quantities according to the specific conditions of the karstification phase. The paper also assesses their role in forming the flow of the Danube River tributaries and classifies the springs based on their regime.

Key words: karst, karst water, regime of springs

MULTI YEAR CHANGES OF THE RIVER DANUBE WATER LEVEL IN THE BULGARIAN SECTION

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This article analyzes the multiyear fluctuations of the river Danube water level in the Bulgarian section based on data for the last 100 years for six monitoring points. Changes under the influence of natural and anthropogenic factors were examined, realization of the extreme water levels, the frequency and distribution during the year have been assessed. The positive and negative cycles of the water level are determined by applying mathematical and statistical methods. The results could be used in navigation on the river Danube and water use for human activity.

Key words: Danube, water level, multiyear

LOCAL CLIMATES OF VARDAR, STRUMA AND MESTA VALLEYS ACCORDING TO KÖPPEN CLIMATE CLASSIFICATION

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Koppen classification is actual and useful for characteristics of different climate types and their changes. Available maps based on this classification are dealing with continental and worldwide zones. This is the reason the mountainous territory of the Balkans to be generalized as zones with cold or high mountain climate without further details.

The main aim of the study is detail classification of the territory of Vardar, Struma and Mesta in the view of the Köppen system and establishing the inner zones variability trough time. In order to achieve this goal we use the SST (sea surface temperature) and precipitation data from meteorological stations located in key areas of the valleys. Index changing is variable trough the different periods but there has a tendency for general reduction of the annual precipitation in the whole period of observation.

Key words: climate, Köppen classification, valleys, temperature, precipitation

ASSESSMENT OF KARST WATER IN NORTHWEST BULGARIA

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Karst waters are widespread in the region of Northwest Bulgaria. In the area of Mizia platform are shaped karst aquifers, and in the areas of the Fore Balkan and West Balkan many karst basins. The author accepted the names of Antonov (Underground waters ..., 1980). In the paper there is a map of all karst basins in this region and a table with their characteristics. Salash and Belogradchik karst basins are in the catchment area of river Lom, Rabisha and Belogradchik karst basins are in the catchment area of river Archar and in that of river Ogosta are Bistrets-Matnishki, Milanovski, Mramorenski, Pastrina, Salash. Although the flow of karst springs has considerable variations – maximum until July, minimum during the summer and winter months, they are used for water supply. Water is on average 40 m depth. Is achieved by drilling wells, mainly in industrial companies, and can be used for manufacture purposes, but not recommended for drinking water supply to the population as karst groundwater is high carbonate content and is not suitable for this purpose.

Key words: karst waters, karst basins, assessment

WATER RESOURCES DETERMINATION OF SURFACE WATER BODIES AT THE BULGARIAN BASINS OF THE LOWER DANUBE

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Object of the study are surface water bodies from category "rivers", according to Water Frame Directive 2000/60/EC. Surface water assessment is important for number of activities such as: water management in the country, making reports to international agencies, determining the change of the resources in the light of upcoming climate changes. It`s determination is based on information of hydrometric stations from the monitoring network system in NIMH-BAS in which are registered real ongoing and available water quantities that are subject of management.

In the study a technology for surface water bodies in the Bulgarian basins of lower Danube is applied, which has been developed in the frame of cooperative project together with Ministry of Environment and Water. Danube river basin is the biggest river basin into the EU and is an example of variety of flow forming conditions. This is absolutely true for the Bulgarian section of the Danube River basin, which is expressed in large quantity and variety of formed hydrologic homogeneous sections. River flow is characterized with annual and inter-annual variability determined by climatic factors and anthropogenic influence.

Available resource of surface water is permanently disturbed by human activity, which has had a significant impact on their natural move. In most cases because of limited number of gauging stations information from them cannot be used directly to determine the water bodies' resources.

One of the main tasks of hydrologic studies is the transfer of information from gauged to ungauged. In this paper is estimated the surface water bodies' resource in original regression relationships based on multiannual hydrological information from the NIMH-BAS monitoring network.

Key words: watershed, water bodies, homogeneous surface water

THE EXTREME WINTER OF 1783/1784 AND FLOODS IN CENTRAL EUROPE

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In this paper we focused on the history of climate in Central Europe during the winter season 1783/84. We describe the weather conditions of this period in Central Europe (low temperatures, frozen soils, snow accumulation and associated floods) on the base of documentary data (newspapers, flood marks). During this period Johann Ignaz von Felbiger conducted early instrumental meteorological observations in Bratislava. Based on these observations the exceptionally cold nature of the winter 1783/84 (as a whole) in Bratislava can be inferred. Felbiger also observed the ice phenomena on the Danube River as well as the amount of snow on the frozen river.

The floods during the winter 1783/84 are covered by documentary data at the broader European scale and in case of the Danube River also by instrumental data. Hydrological measurements from this period are available for the Danube in Vienna from 1 January 1784. The measurements were made under the direction of the Jean-Baptiste Bréquin and were published in the Wiener Zeitung. Our contribution presents the findings about it.

Key words: Cold winter, air temperature, snow, floods, documentary data

SHIFT OF CLIMATIC ZONES IN THE DANUBIAN LOWLAND IN SLOVAKIA BASED ON KONČEK'S CLASSIFICATION

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Climates can be classified using a variety of methods. Analysis based on the Končeks method is the most frequently used regional climatic classifications in Slovakia. The boundaries between different climate types tend to shift over time. Our aim is to detect territorial shifts in climate regions and sub-regions in the Danubian Lowland during the 20th century and at the beginning of the 21st century using the Končeks climatic classification scheme as well as on the base of modified climate models outputs (climate change scenarios) to outline possible trend in this territory in the future. Two regional climate models (RCMs) (Dutch KNMI and German MPI), both forced by ECHAM5 GCM boundary conditions, have been used at the design of climate change scenarios for Danubian Lowland region. The Danubian Lowland in Slovakia (southwestern Slovakia) represents a northern part of the Little Danubian Basin (Little Hungarian Plain). Analysis based on this climatic classification shows that during the 20th century and at the beginning of the 21st century certain territorial shifts in climatic sub-regions in the Danubian Lowland have appeared. The climate has become warmer and more arid in this area. Scenarios show the additional warming and increase of aridity in this territory by the end of the 21st century.

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Key words: Cold winter, air temperature, snow, floods, documentary data

FAUNISTIC STUDY OF THE DANUBE ISLAND TSIBAR

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Tsibar island is situated on Bulgarian part of Danube river, at the 680 m of the Bulgaian and about 100 of the Romanian coast from 716 to 719 km along the river, with an area of 1.3 km2. The territory is covered mainly by riparian woodland. Because of its European importance to the protection of rare and threatened habitats, plants and animals, including birds the island falls within the borders of proposed Natura 2000 sites under both the Birds and the Habitats Directive. Part of the island is placed under strict protection as a maintained reserve "Ibisha". In 1997 the territory was designated as Important Bird Area by BirdLife International. In 2002 the reserve has been declared as a Ramsar site according to the international convention for conservation of wetlands. Tsibar island is of international importance defined by the one of the largest mixed colony of herons and cormorants in Bulgaria. It is a site of global importance for the nesting Pygmy Cormorant (Microcarbo pygmaeus) and White-tailed Eagle (Haliaeetus albicilla) and one of the most important sites in Bulgaria for the nesting species Night Heron (Nycticorax nycticorax), Squacco Heron (Ardeola ralloides) and Spoonbill (Platalea leucorodia). There are identified more than 100 animal species: 40 terrestrial and 11 aquatic invertebrates, 5 fish species, 1 amphibian and 1 reptile species, 30 birds (including 22 breeding), 16 mammalian species (including 8 species of bats). Ascertained are the Medicinal leech (Hirudo verbana), which is a rare species at European level, endangered Thick shelled river mussel (Unio crassus), protected fish Asp (Leuciscus aspius) and Great raft spider (Dolomedes plantarius), included in the Red Data Book of Bulgaria in the category "extinct". A management plan for Ibisha Maintained Reserve was developed in 2015.

Key words: fauna, Ibisha reserve, Tsibar island

WATER QUALITY OF THE DANUBE RIVER IN SERBIA DOWNSTREAM FROM THE DJERDAP LAKE

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Given the Danube is Europe's second-longest river and its significance for human life, it is important to maintain good water quality and protect it from pollution. Based on data of the quality of water, collected by the Republic Hydrometeorological Service of Serbia, a statistical analysis of certain parametershad been performed, which made it possible to qualitatively determine the water quality of the Danube. Water quality was analyzed for the period 2005-2014 onthe profile Radujevac. Water Quality protection of the Danube is one of the priority tasks of the cross border regions and countries through which it flows.

Key words: Danube, Serbia, Water Quality

IMPACT OF VOLCANIC ERUPTIONS IN EUROPEAN AREA ON THE CHANGE IN CONCENTRATION OF CARBON DIOXIDE – CASE STUDY OF BASIC ENVIRONMENTAL OBSERVATORY "MOUSSALA"

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The volcanic eruptions are one of the most characteristic natural sources of CO_2 in the atmosphere. To study the effect of volcanic eruptions in increased levels of CO_2 data from Basic Environmental Observatory (BEO) "Moussala", for the period July 2007 - March 2015, are used. Carbon dioxide is not a health hazard gas and there is no established limit concentration of Bulgarian and international law. As extremely high values in this study have been accepted the values that exceed the 95th percentile of the distribution of the daily average values for the studied period. Days with exceedances of CO_2 concentration was analyzed in terms of the volcanic activity (Etna), which could affect the investigated area with the spread of air pollutants, and CO_2 also.

The simulations developed by Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT) Model are used in order to describe the trajectory and dispersion of pollutant and products from eruptions of Etna in the atmosphere. The synchrony between occurrence of days with extreme high concentration of CO_2 in the atmosphere and eruptions of Etna volcano is established in the most of investigated cases.

The analysis of the results from BEO "Moussala" confirms the impact of the volcanic eruptions and Etna volcano, in particular, for the increasing of concentration of CO_2 in the atmosphere. From the other side it is established that the activity of Etna is not only the factor which has impact on the concentration of CO_2. The depth analyses not only of natural but also of anthropogenic factors have to be done in the future in order to clarify the reasons for increasing the concentration of CO_2 in the atmosphere.

Key words: carbon dioxide, Etna volcanic eruptions, Bulgaria, HYSPLIT Model

THERMAL BEHAVIOUR OF LOCAL CLIMATE ZONES UNDER IDEAL AND AVERAGE CONDITIONS IN SZEGED BASED ON A ONE-YEAR MONITORING NETWORK DATASET

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The purpose of our study is to evaluate the differences among thermal characteristics of local climate zones in Szeged. These differences were examined under average conditions and on ideal days, when the weather situations were favourable for the development of the local scale climatology especially for the urban heat island (UHI) phenomenon. The dataset was provided from a 24-station urban monitoring network established in Szeged, Hungary. The representativeness for the local climate zones of Szeged was an important requirement in the installation of the network. Our examined period was June 2014 – May 2015 thus characteristics of all seasons and a whole year were evaluable. In our investigation inter-zone and intra-zone comparisons were carried out accordingly the thermal differences among the zones and the stations within several zones. In addition, this monitoring network provides the opportunity to evaluate the temporal development of spatial pattern of UHI. Our results show that the temperature differences from the rural site are larger in the densely built compact zones than in the open and natural zones. Within the urban area there are differences between the built-up types, which are higher in case of ideal conditions. The findings of our investigation draw the attention to the differences in thermal characteristics of the several built-up types, which can provide information for urban planning.

Key words: urban climate, urban heat island, local climate zones, monitoring network, Szeged

CLIMATIC INDEXES DERIVED FROM METEOROLOGICAL STATION ZEMEN AND THEIR APPLICATION IN AGROCLIMATOLOGICAL AND GEOMORPHOLOGICAL RESERCH

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Climatic indexes are widely used tool in contemporary studies of various types of climatesalong with numerous natural processes and phenomena. In order to meet the needs of various scientific tasks these indexes are developed or improving their precision and implementation on different areas.

Collected data form meteorological station Zemen is used to calculate climatic indexes. In the presented study authors emphasize on their application in agroclimatology and geomorphology. An attempt is made to determine the periods with certain conditions for development and activity of different environmental processes, some of which have influence on the landscape and therefore on economic and social activities in the study area. Such periods are drought and heavy rainfalls, duration and retention of snow cover, periods with high and low values of air and soil temperature. Climate conditions are comment as factor for different slope and erosion processes activity.

Key words: agroclimatology, geomorphology, drought, snow cover, soil temperature, frost, weathering, mass movement, fluvial dynamics, erosion

CHANGES IN COLD WAVES PARAMETERS IN SOUTHERN ROMANIA

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The most recent studies indicate that cold waves have, in many cases, effects on environment and society comparable to that caused by heat waves. The aim of this study was to analyze changes in cold waves features in Southern Romania over a 55-year period (1961–2015). They were identified based on daily minimum air temperature recorded in 11 weather stations. In this study a cold wave event was considered when minimum air temperature was below the threshold of 10th, 5th and 2th percentile for at least three consecutive days. Percentile thresholds were calculated for the 1981–2010 interval. Seven parameters of cold waves were analyzed: the total number of events in a year, cumulated duration in a year, mean duration in a year, the longest yearly event, as well as mean, maximum and minimum intensity. To detect trends in cold waves parameters Mann-Kendall test and Sen's slope estimator were employed. The results showed that cold waves recorded a generalized decrease in all parameters considered, especially in the annual number of events as well as in cumulated duration in a year. Increasing trends were recorded mostly in the maximum intensity of cold waves suggesting that they have become milder over the considered period. As an overall conclusion, our results emphasize that cold waves have become shorter and less intense in Southern Romania.

Key words: cold wave, Mann-Kendall and Sen's slope, climate change, Southern Romania

HYDRO-METEOROLOGICAL DROUGHT IN THE DANUBE PLAIN, BULGARIA

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Drought has affected 37% of the European Union's territory in the past three decades, causing ecological and socio-economical damages and impacting more than 100 million inhabitants (EC 2007). The negative trend in many years' precipitation changes established in various regions of Bulgaria show that there is high probability of occurrence of frequent and intensive droughts in the country.

The purpose of this study is to evaluate the occurrence of hydro-meteorological droughts in the Danube Plain territory, North Bulgaria. The investigated area is a rural region with intense agricultural production and developed food industry and is a drought prone region. As a natural hazard, drought is best characterized by multiple climatological and hydrological parameters. In the present study the meteorological drought is analyzed by Standardized Precipitation Index (SPI) and the hydrologic drought is defined by Stream flow Drought Index (SDI). Both indices are calculated for overlapping periods of 6 and 12 months at seven hydrometric and nine meteorological stations located in the Danube Plain over the period 1993–2009. The results based on the SPI and SDI show that almost all the investigated areas suffered from mild to moderate droughts during the study period. Severe hydrological droughts occurred only for one station in the beginning of the investigated period (1993–1994). The driest years are 2002 and 2007 when severe or extreme meteorological drought has been observed in some of meteorological stations but hydrological data show mainly moderate drought in most of cases.

Results also showed high correlation between many-years variability of meteorological drought index (SPI) and hydrologic drought index (SDI). The values of the correlation coefficients between SPI and SDI–12 are higher than between SPI and SDI–6. From other side according to SPI dry years represent about 40 to 50 % of the years in the period 1993–1999 and SDI shows that more than 70% of the investigated years are dry. This indicates that rainfall is not the only factor that determines hydrological drought.

Key words: drought, Standardized Precipitation Index, Streamflow Drought Index, discharge, precipitation

ONE YEAR INTRA-URBAN CLIMATE OBSERVATION IN NOVI SAD (SERBIA)

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The objective of this paper is the evaluation of the installed urban climate monitoring network system in Novi Sad (Serbia) for intra-urban comparisons.

The automated Geographic Information System method was used for defining and delineating seven Local Climate Zone (LCZ) and two land cover types occurring in the study area. Monitoring network contains 27 stations. The measurements from stations are wirelessly uploaded every 10 minutes to a database for immediate and subsequent processing and analysis.

Datasets analysis is based on the first year operation period (from 01.07.2014 to 30.06.2015) of the station network for air temperature (T) and relative humidity (RH). The intra-urban analysis are based on conparisons of various indexes from different LCZ-s. The selected times are from periods with maximum T and RH differences among different urban LCZ-s and between urban areas and nonurban environment.

The results showed adequate and logical spatial and temporal patterns of T and RH in Novi Sad urban areas and nonurban environment. Temporal comparisons showed the biggest differences of T and RH between mid-rise built types and nonurban environments. Spatial analysis confirmed that the thermal comfort of urban dwellers is less adequate in the most urbansed areas.

Key words: Local Climate Zones (LCZ), Intra-urban analysis, Temperature, Relative Humidity, Novi Sad (Serbia)

ALTERATION OF SPATIAL PATTERNS OF NOCTURNAL CLIMATE INDICIES DURING THE 21TH CENTURY IN CASE OF SZEGED, HUNGARY

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Studying the urban environment is important because of the high number of the involved inhabitants. In urban areas surface cover and geometry differ from the rural surfaces, and the water and energy balances are modified. As a result the thermal environment is significantly modified, the nocturnal temperature usually higher in urban areas compared to the surrounding rural environment. In case of summer heat waves the increased nocturnal temperature might be very stressful as the lack of nighttime recreation is harmful for the human well-being and health. In heat waves if the minimum temperature is over 20 °C a significant increase of the mortality rate was observed in numerous settlements. Therefore it is an important question how the temperature change varies according to the different built-up types and how is it possible to mitigate climate change at local scale using urban planning actions and which built-up types are preferable? This study evaluates the alteration of nocturnal climate indices namely warm nights (Tmin ≥ 17 °C) and tropical nights (Tmin ≥ 20 °C) during the 21st century in Szeged. The backbone of the modeling process is the MUKLIMO_3 urban scale microclimatic model. In the model for the land use we utilized the Local Climate Zone (LCZ) system. The model outputs are one day simulations. We applied a statistical downscaling technique – the so called cuboid method – in order to generate the 30 year mean values of climate indices using the single day simulations and climate datasets. The indices in case of the present climate (1981–2010) were calculated based on measurement data. For the future change of the climate indices we applied the results of Representative Concentration Pathways (RCP) scenarios namely RCP4.5 and RCP8.5 for 2021-2050 and 2071–2100 from the EURO-CORDEX datasets.

Key words: urban climate, climate change, urban climate modelling

ASSESSING FLOOD RISK USING GIS IN KANJIZA (SERBIA)

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Floods cause numerous considerable problems in economy, society and environment on low lying parts of Serbia. Since we have small impact on formation of the flood hazard, our focus should be on reduction of vulnerability and exposure to the risk event. By applying the GIS tools, floods risk areas in Kanjiza municipality was extracted. Based on digital elevation model, categorization of different hazards level was done. Impact levels were calculated for impact value by building types and by number of inhabitants per building types taking in consideration the civil protection level. As the final result, the risk map shows four floods risk level zones in study area ranked from "Low", "Medium", "High" to "Very high" which can be used by the local authorities in order to design strategies for reducing negative effects from floods hazard.

Key words: floods, Kanjiza, risk assessment

ANALYSIS OF THE MEAN OF DAILY MAXIMUM TEMPERATURE WITHIN THE ROMANIAN PLAIN (1961 – 2015)

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The present aims at rendering the characteristics of the means of the daily maximum temperature at monthly, seasonal and annual level within the Romanian Plain, as well as their trends. The time series cover a 55-year period (1961-2015) and data come from 8 meteorological stations. In order to assess the distribution of the data, there were calculated two coefficients (Skewness – S and Kurtosis – K) and also applied the Kolmogorov-Smirnov test for normal distribution. The positive S values and negative K values indicate that the distribution is not symmetrical but, taking into account that the values are quite close to 0, we may assume, it is not far from normal. The KS test also indicates a normal distribution. Homogeneity of the annual temperatures was tested by means of Pettitt test, Standard Normal Homogeneity Test (SNTH) and T-test, which emphasized that the change point was registered before 2000. At three stations (D.T. Severin, Bechet, Buzău) all three applied tests indicated the same year 1988, respectively 1989 as break point, while at the other stations, it is the same year according to SNHT and T-test, and a different one based on MWP. Based on Mann-Kendall test and Sen's slope estimation, there were emphasized temperature trends and their statistical significance. The highest temperature increase and upward trend was registered for mean annual and mean summer values (0.001 level of significance within the entire region). However, except for autumn, which is generally characterized by statistically insignificant negative trends, all the other seasons display significant upward trends. At monthly level, only the summer months registered upwards trends within the entire plain (level of significance oscillating between 0.05 and 0.001), while in autumn months there were not registered any statistically significant trends.

Key words: maximum temperature, normal distribution, homogeneity tests, Mann-Kendall test, Romanian Plain

GIS SPATIAL ANALYSIS OF THE DISTRIBUTION OF SNOW DEPTH: A STUDY OF WESTERN RHODOPES, BULGARIA

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The aim of the present research is to show the advantages of information technology in investigating the snow cover. The snow data is usually taken from the measurement in meteorological stations which are often sparsely and insufficient. The problem in the analysis of the snow cover is how to present point data spatially and what is the most appropriate model. In this case it is necessary to determine the main factors for the territorial distribution of the snow depth and to evaluate the type and strength of the relation between independent and dependent variables.

The area of the present research is the western part of Rhodopes Mountain, situated in the Southern Bulgaria. The relief is variable from low to high mountainous and the climate is influenced by the high altitude and Mediterranean air advections. The spatial analysis of the distribution of snow depth is done in ArcGIS by application of Spatial Statistics Tools and Geostatistical Analyst. Having regarded the geographical location of the territory and its natural properties we considered altitude, aspect, slope and solar radiation as explanatory variables that could be used for determination of the territorial distribution of the snow depth. These factors are determined on the base of digital elevation model and the relationship between variables is evaluated by application ordinary less squares (OLS) analysis and geographically weighted regression (GWR). Applying the GWR between the above 4 explanatory variables and snow depth shows high coefficient of determination ($R^2 > 0.9$) and strong relationship. Spatial presentation of point data is done by inverse distance weighted and ordinary kriging interpolation. The both methods show that the interpretation of the results should be done taking into account the relief and the exposition of the territory. Future studies should be focused in finding the most proper way for removing data imperfections and spatial presentation of point data from sparsely and insufficient meteorological stations in complicated mountain relief.

Key words: snow depth, spatial interpolation, regression, correlation

APPLICATION OF GIS TECHNIQUES FOR THE QUANTIFICATION OF LAND DEGRADATION EXPOSED TO FLOOD RISK AND URBAN DEVELOPMENT. CASE: DOLJ COUNTY (ROMANIA)

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The study aims to measure the loss of agriculture terrain in Dolj conty Romania. The proccess is determined by 3 major phenomena, increase risk of flood, urban agression and desertification.

Dolj county, situated in the South-West Romania, has a very important share of agriculture land, almost 78.9% of its surface. Of the total agriculture land, almost 18,11% is affected by flood risk, in particular localities situated on the Danube meadow, and on the riverside of Jiu. To quantify all land situated in the risk zones were used GIS technics.

Also other results were aimed to reflect a dynamic analysis of the use of land and it influence on rural development.

The use of this study is to put together public representatives, private and political actors in active participation in order to manage the organization of rural space and to develop ties with other regions in order to create smart solutions for Dolj county.

Key words: flood risk, agriculture, stakeholders, Dolj county, Romania

ASSESSMENT OF THE SOIL LOSS CAUSED BY RIVERBANK EROSION IN SERBIA

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Riverbank erosion and lateral channel migration are important geomorphological processes in Serbia which caused a various landscapes, socio-economic and environmental consequences. For the whole territory of Serbia, there is no the available data about the losses of soil caused by riverbank erosion. In this study, we will assess the spatial and temporal dynamics of riverbank erosion for some rivers in Serbia (Drina, Kolubara, Velika Morava, Pek and Veliki Timok) during large time-scale using remote sensing and GIS. Comparing the data from different periods, we will determine the evolution and the rate of lateral channel migration over large-scale periods. The importance of bank erosion is in changing sediment discharge downstream, where the increase in suspended sediment loads is attributed to bank collapse. Bank erosion data derived from a GIS overlay methodology for the different periods and rivers in Serbia will be used to estimate the sediment generation from riverbank erosion. The aim of this research is to estimate the rates of bank retreat and losses of soil for some rivers in Serbia, the relation between the rate of sediment supply from bank erosion and the rate of sediment discharge compared to long-term rates, and connect them to human or natural processes as influencing factors. The data presented here are significant for practical issues such as predicting channel migration rates for engineering and planning purposes, soil and water management, etc.

Key words: riverbank erosion, lateral channel migration, sediment discharge, soil loss, Serbia

COMPLEX AND MULTISCALE LANDSCAPE STUDIES IN THE NORTHWESTERN BULGARIA WITH APPLICATION FOR ENVIRONMENTAL HIGHER EDUCATION

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Paper presents methodological and scientific results of landscape studies conducting for the last 10 years in the Northwestern Bulgaria, municipality of Belogradchik, in the framework of long field course for the high-year students of Moscow State University specialized in landscape and environmental science. The territory in study has a high level of landscape diversity and a particular composite land use and land cover past and contemporary patterns. It also contains several unique landscape and geomorphological phenomena such as widely-known Belogradchik rocks. Landscape maps in different scales were created with the use of field and remote sensing data for the territory of "Belogradchik rocks" natural monument (36 sq. km, scale 1:25 000) and for the whole territory of Belogradchik municipality (300 sq. km, scale 1:100 000). During different years of field course we elaborate some landscape-based methods for environmental assessment and learn our students to detect in field the condition of forest stands, to distinguish and mapped abandoned agricultural lands, to reveal landscape aesthetics with the preference to recreational use and plan tourists tracks and routes with high scenic value. All the results of such studies are mapped and also presented as thematic layers in GIS and in Web-GIS application "Moscow State University's Geoportal". Landscape units mapped in different scales are a reliable base for spatially explicit environmental assessments and planning of nature conservation measures that's why landscape field studies may be considered as an inherent part of higher education in environmental science as a whole.

Key words: landscape, Belogradchik, environmental assessment, GIS

FLOOD VULNERABLE AREAS IN SLOVAKIA BASED ON MULTICRITERIA ANALYSIS

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Flood vulnerability is a common effect of two independent mechanisms natural conditions and the human activities in the basin. The primary impulses of floods are usually extremely intense precipitation. The total catchment's hydrological response to intense rainfall is determined by its natural environment, a whole complex of characteristics of the basin. The aim of the present study is to generate a composite map for decision makers using selected factors causing floods. In the analyses, some of the causative factors for flooding in a basin area are taken into account, such as precipitation, geology, land use, size of the catchment and basin slope. A case study of flood vulnerability identification in catchments' areas in Slovakia is employed to illustrate the different approaches. A geographical information system is integrated with multicriteria analysis in the paper. We created two multicriteria vulnerability maps for Slovakia. Our pilot study showed significant differences between both methods – Ranking method and Analytical Hierarch Process. The different results obtained from these two methods indicate the importance of the decision maker in determining the weights and the proper method, and making the decision. The weighting of the criteria significantly affects the results of the overall evaluation.

Key words: geographical information system, flood risk, multicriteria analysis

AN ATTEMPT TO RECONSTRUCT HISTORICAL ANTHROPIC LAKES NETWORK IN NORTHERN PART OF THE MOLDAVIAN PLATEAU (NE ROMANIA) BASED ON HIGH RESOLUTION LIDAR DEM INVENTORY AND GEOMORPHOMETRIC ANALYSES OF ABANDONED DAMS

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A particular environmental feature of the northern part of Moldavian Plateau (NE Romania) is the large number of anthropic lakes along river courses. Even more, due to climatic, hydrological, hydrogeological and geomorphological settings and human activities (dominated by an extensive agriculture) this characteristic was mentioned and mapped in writen records and cartographic representations in many historical stages of humanization of mentioned region. The need for watter supply have forced the inhabitants to build dams of various sizes along the entire river network. Over the time, many dams were abandoned, while others have been relocated with a impresive dynamic at historical time scale.

Until nowadays, the spatial distribution of these historical generations of lakes was available only for certain periods (the case of historical maps) being characterized by numerous localization uncertainties and incompleteness.

Analizing recent high resolution Lidar DEM images, we have perform an accurate inventory of abandoned dams. Using generating „contour function" of Global Mapper v.15.0 package, we have recnstruct an approximately spatial extension of corresponding lakes. Some of them have been recognized on old maps (topographic map form 1894, 1940, 1960, 1984), while many others have been identified and mapped for the first time in this work.

Key words: historic lakes, Lidar DEM, abandoned dams

GIS ASSESSMENT AND PLANNING OF CONSERVATION PRIORITIES OF HISTORICAL CENTERS OF INDUSTRIAL CITIES. CASE STUDY: REŞIŢA MUNICIPALITY

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The aim of the study is to assess the historic center of the town of Resita by using Geographical Information System. The first step taken towards the goal of the study was to inventory the historical monuments in the city of Resita and to create a database containing the buildings' characteristics. A GIS-based conceptual model was design for urban heritage conservation, which integrates two parts: one serves for urban heritage inventory and another serves for evaluation of degree of conservation of historical district of the city of Resita. Multi-Criteria Analysis was used as a method to achieve a detailed analysis of the cultural heritage of the historical district of Resita. This method is currently used in urban heritage conservation, and it includes economic, social, environmental factors and so on. The specificity of the historical monuments in the Resita municipality is closely linked to the history of industrialization, as Resita is one of the cities with the most numerous industrial-heritage assets classified as historical monuments at the national level. Resita, as an industrial town, failed to benefit from any special concern for evaluating the degree of cultural-heritage conservation.

The results obtained are related to the identification of the typology of the heritage buildings in terms of physical condition and their perspective of reuse (restoration, redevelopment).

Field research led to the conclusion that there is a significant number of historical monuments with moderate and a bad degree of conservation. Also, there is a limited number of historical monuments that have been restored.

Key words: GIS, conservation, Resita municipality

MAPPING AND ANALYSES OF STRUCTURAL INDICES OF THE TOPOLOVETS RIVER BASIN

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The Topolovets river is a river in the western Danubian Plain of northern Bulgaria, a right tributary of the Danube. It originates in the western Balkan Mountains and is around 68 km in length, with a drainage basin of 583 km². The present work is an attempt to carry out a study of structural indices of the Topolovets river basin. The indices of the structure of bifurcation, basin area structure, stream length structure, stream slope structure are used. The spatial differences in the sub basins are evaluated.

Key words: Topolovets river, structure of bifurcation, structure of the longitudinal profile of streams, stream slope structure

SPATIAL ANALYSIS OF LINEAR MORPHOMETRIC PARAMETERS OF ARCHAR RIVER BASIN

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Morphometric analysis particularly deals with quantitative measurements of different aspects of river channels: stream order, bifurcation ratio, stream length, drainage density, drainage frequency, constant channel maintenance, etc. The Archar River is a river in the western Danubian Plain of northern Bulgaria and a right tributary of the Danube. It originates in the western Balkan Mountains and is around 60 kilometres in length, with a drainage basin of 365 sq. km. The present work is an attempt to carry out a study of linear morphometric parameters of Archar river basin by using topographic maps and Geographical Information System (GIS) techniques. The morphometric spatial analysis includes the assessment of various linear parameters. The spatial differences in the sub-drainage basins are evaluated.

Key words: Archar river, stream order, bifurcation ratio, drainage density, drainage frequency

THE EFFECTS OF ROAD DENSITY ON HABITATS FROM THE NATURA 2000 SITES IN ROMANIA

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The habitats and species of community importance conservation and protectionare an important objectives for the European Union. These objectives are attainable through the Habitats and Birds directives implementation. Based on the two documents, the Natura 2000 network of protected areas at European Union level was established. Loss and habitats fragmentation are the main threats to biodiversity conservation and thus must be addressed.

Our study aims to evaluate the impact of the transport infrastructure over habitat richness and conservation status of species of community importance form the Natura 2000 network in Romania. Also, the study looks at how the protected areas distribution and major landscape characteristics influence the transportation network planning. The Natura 2000 sites (374 sites), terrestrial or freshwater areas (only SCIs), were included in the study. We have identified 65 types of habitats included in Annex 1 of the Habitats Directive, and calculated the habitat richness for each SCI.

The density of the transport network was determined for each Natura 2000 site included in the study using ArcGIS software. The average value calculated is 0.47km/kmp. The landscape fragmentation induced by the transport network was evaluated usingvarious fragmentation indices (landscape division, splitting index, effective mesh size, number of patches), calculated with the Vector-based Landscape Analysis Tools (V-LATE, version 2.0). Relations between the transport network density and habitat fragmentation, but also habitat richness, were statistically analysed.

Our results showed that the habitats in Natura 2000 network are highly fragmented, with considerable negative impact over the existing species. There are few roadless protected areas in the sampled SCIs, located in areas with high and rugged mountainous terrain, scarcely populated.

The results underline the necessity of transport networkplanning considering the landscape characteristics, but also the protected areas distribution and value (habitats and species richness), in order to have a well-balanced territorial planning.

Key words: habitat heterogeneity, road density, landscape fragmentation, Natura 2000 sites, Romania

OPEN SOURCE WEB-BASED GIS VISUALIZATION TOOL OF WATER RELATED DATA FOR THE RIVER BASIN OF YANTRA

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The web-based geovisualization tools development boom in the recent years shows constant trend of demand of comprehensive applications for spatial data visualization and dissemination. The range of users increases exponentially, particularly the users of the mobile visualization applications.

The main purpose of the current research is to develop a user-friendly spatial data viewer of Yantra river watershed showing information about the variety of water related data. The application-prototype is developed in several versions using only open source software through all the stages. The data were processed in Q-GIS, the database was developed in PostgreSQL and uploaded on GeoServer, the Web Feature Service (WFS) from GeoServer was used to represent the Vector Data Layers, and the GeoExt JavaScript Toolkit for rich web mapping applications based on OpenLayers library was used at the final stage of the development of the tool. The application was developed for desktop users. The tool could be improved further through extension of the functionalities, addition of analysis tools, regular information update and the development of a mobile version.

Key words: geovisualization, web-based GIS, open source software

LANDSCAPE PLANNING: LANDSCAPE CHARACTER ASSESSMENT OF THE NATIONAL PARK FRUŠKA GORA

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European landscapes are losing its unique character which caused a growing popularity of landscape in policy debates, scientific conferences and finally resulting in the European Landscape Convention (Council of Europe 2000). European Landscape Convention was proposed a broad and comprehensive definition of landscape: "Landscape means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors". Fundamental phenomena in landscape are reflected in its unique character, created as a result of action and interaction complex, and manifested through historical legacy and contemporary dynamics. One of the general national measures in Convention is to integrate landscape into its regional and town planning policies and in its cultural, environmental, agricultural, social and economic policies, as well as in any other policies with possible direct or indirect impact on landscape. Specific measures indicate how this can be achieved. It requires "research and studies in order to identify landscapes and analyses their characteristics and the dynamics and pressures which affect them."

Landscape character assessment as a method became very popular, especially after European Landscape Convention. Identification and interpretation of a specific landscape character, as well as the assessment of its value are positioned in the contemporary practice as the crucial part of landscape planning and management. The concept of protection, planning and development of the landscapes in the Spatial Plan of the Republic of Serbia 2020 is based, inter alia, on the following: preservation, improvement of landscape character, as well as connecting values in the space (local, regional, national, ecological and cultural networks).

As a results of the landscape character assessment of the Fruška gora National Park, this paper gives an overview of the main landscape character types and emphasizes the landscape character as a new value. Finally, some thoughts are formulated how to preserve and improve landscape character of the Fruška gora monasteries as a task of general national measures in European Landscape Convention: „landscape" integration in forest policies in Serbia.

Key words: Landscape planning, Fruška gora National Park, Serbian Forest Policy

„LIMES ROUTE" THE NEXT WORLD HERITAGE SITE IN HUNGARY

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The national monument preservation offices in Hungary and Slovakia started this Danube Limes project with the aim to support the innovative and sustainable European initiative as well as to find long-term solutions relating to the protection of the archaeological resources, to preserve and protect the still existing monuments and sites and to develop better management structure and presentation principles.

Nominating not only a few sites for World Heritage status but a complex system of frontier installations, altogether a line of 420 kilometres with more than 200 individual sites in Hungary and Slovakia to consider, is a very ambitious task. And even more so because we are operating in the densely populated Danube area, which is very different from the individual Roman frontier sections in the United Kingdom and Germany already inscribed as World Heritage Sites. But we strongly believe it is worth all our efforts to safeguard an important part of our common heritage throughout Europe for the next generations.

We would like to dedicate this publication to the people of the Danube region living in this vast area, facing major social, cultural and economic challenges in their survival in a changing environment.

Key words: Danube Limes, world heritage, thematic route

THE EMPIRE AS A HERITAGE (TURKEY – THEN, NOW AND …)

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The time continuum of our existence and development – past, present and future, reminds us that we cannot understand contemporaneity without knowing the event framework of human history. The ideas, concepts, images, aspirations, ambitions, formed in it, are those spiritual elements, which pass through the time benchmarks of human existence and give to their differentiation great amount of conventionality. This applies to the Balkans in full extent, where the past is still part of the present. Placed in the conditions of constantly changing socio-economic and cultural models, hindering their own development, the peoples from this part of the world are forced to turn to history as an instrument for strengthening of their national identity. The problem is that very often the reconstruction of the historical process is burdened with ideologemes, behind which can be noticed concrete foreign-political ambitions and objectives, extending far beyond the nationally-sacred. Thus for the Balkans the exposition of the past-present relation is connected mainly with the generation of conflict potential, and not with the search for constructive welding for the future.

From this point of view, the polemics provoked by the contemporary Turkish foreign policy is not surprising. The desire of the country to transform itself into an independent geopolitical center with its own interests, behavior and influence in international relation is accepted with worry by the countries in the Black Sea Region. The ideological rhetoric used for argumentation of its foreign-political behavior is considered by the neighboring countries rather an undisguised ambition for domination within the borders of the former Ottoman Empire, based on the Muslim and Turkish communities, than an intention for development of mutually advantageous regional cooperation. Reality that puts a number of essential questions. What are the geopolitical parameters of the Turkish foreign policy? Which are its instruments? What cultural iconography shares the Turkish community? In our opinion the answers to these and other questions will allow the finding of a starting point for understanding of the contemporary politico-geographical processes in the Caspian-Black Sea Region and the role of Turkey in them.

Key words: Turkey, foreign policy, Neo-Ottomanism

BEHAVIOURAL GEOGRAPHY OR BEHAVIOURAL APPROACH – CURRENT CHALLENGES AND PROBLEMS

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It is accepted that behavioural geography begins its development in the second half of XX century so it is considered as an "old" sub-branch of geography science. But even nowadays we still lack consensus in different geography schools if it is a well-determined science or only a very useful approach.

Behavioural geography has a great theoretical and applied potential in tackling the "key" problems of contemporary human-nature interaction using concepts like cognitive mapping (e.g. of world) and place attachment (e.g. of home town or region) and defining the main factors which influence the spatial perception and behavior when investigating environmental, urban, political and economic issues putting stress on microscale level and individuals (on contrary to other geography disciplines).

The main aim of paper is to analyze and point out the main problems which this geographical sub-branch is facing in Bulgaria:

As behavioural geography in Bulgaria is developed since 1990, the Bulgarian geography community should critically consider and evaluate the achievements of other scientific schools and elaborate its own understanding of scientific essence and significance of this sub-branch.

It is important to search for the possibilities which this geography sub-branch offers to Bulgarian geography and its influence to the other important and well-developed fields like cultural geography, economic geography, GIS and cartography, urban studies and geography didactics.

Key words: behavioural geography, cognitive mapping, spatial behaviour

DEVELOPMENT OF URBAN AND RURAL AREAS OF THE LOWER DANUBE AREA IN SERBIA

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River Danube represents one of the main axis for spatial development and functional networking of settlements in Europe, both at the national and international level. However, despite the central position of Serbia in Danube area in Europe and potentials for integration of the territory in this area, these advantagesare notyet valorised appropriately in spatial development of the territory. This paper examines the emergence and development of urban and rural areas within the Lower Danube area in contemporary network of settlements in Serbia. This research is based on the analysis of relevant demographic, spatial, and socio-economic indicators with the aim to identify and critically examine the role and importance of the Danube development axis in linking and integration of urban centers with their surroundings. Results of the research presented in this paper may be significant for further spatial development of Danube area in Serbia. In that context some recommendation and conceptual frameworks are suggested.

Key words: Lower Danube area, urban and rural areas, Serbia

VILLAGES ON THE EDGE OF EXTINCTION – THE HUNGARIAN SITUATION

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In the last decades the villages had disadvantageous situation in Hungary. Because of the lack of working places and the bad infrastructure facilities strong out migration started from the villages after 1945. This migration was selective, manly the young and well-educated persons moved out. The population of the small villages became older, so because of the natural decrease, the out migration and the bad condition of services some villages became at the edge of extinction. After 1990 the situation changed, a strong differentiation process started in Hungary. The situation of the villages on the rural peripheries remained as bad as before, but some villages are now in good position. It depends on the geographical location, the small villages near the western border of Hungary, near the main touristic attractions and the large towns are dynamic now.

In the research we deal with the population trends of the smallest settlements of Hungary. We compare the villages on the edge of extinction (less than 25 inhabitants) with the small ones (under 250 persons). We focus on those villages, where there was a population change turnaround in the last two decades. We made clusters of the small villages (652 in Hungary) by their population change trends in the last century and we can show the clusters by some case studies. Although the small villages are in really bad situation now in Hungary, there are some really dynamic ones among them. We focus on the reasons of the new population change trends.

Key words: small villages, Hungary, population trends, village extinction, peripheries

EDUCATIONAL STRUCTURE AND DEMOGRAPHIC POTENTIAL OF THE POPULATION IN VIDIN DISTRICT IN RELATION TO THE EDUCATIONAL INFRASTRUCTURE

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The paper focuses on one of the important social aspects of the population – its educational structure (shares of population with different educational level according to the last census data – 1. Feb. 2011). In order to reveal the most significant characteristics of the population in terms of current number of students, an assessment of the demographic potential of the district's population has been made. This aims to assess and analyze the current educational infrastructure of the studied area regarding its relevance to the current needs, remoteness of schools (i.e. the so-called "protected" and "central "schools), and schools prone to near future closure and overall evaluation of the school network. In addition, some relevant socio-demographic issues such as "relatively high demographic potential – relatively low educational levels" are also discussed in the paper.

Key words: educational structure of the population; demographic potential; school network; socio-demographic problems

DEPOPULATION IN RURAL AREAS OF DOBRUDZA REGION AND ITS IMPACT ON THE SCHOOL NETWORK

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Approximately 1.9 million residents live in Bulgarian villages today. In the early 2015 of all 5264 towns and villages in Bulgaria the number of towns is just 257. Villages predominate. A sufficient part of the population of the state spends its lives in them and in their adjacent territories so that it should be thoroughly researched and analyzed – the population itself with its demographic characteristics, as well as the rural areas with their features and distinctive aspects.

For the objective of this paper the rural areas of the municipalities Silistra and Dobrich are selected. Each one of them has its distinctions from the others (sea outlet, river outlet or inland territory). Thus conceivably the differences of the examined indicators could be determined in view of their geographic location.

Depopulation is a serious demographic problem. This process gives negative trends in rural areas. Closed schools and students decreased in others. These processes in the Dobrogea area are strongly negative. This article examines these processes in analytical and spatial order. Use the most current statistics data.

In demographic collapse, where each generation is smaller, hardly the trend of students reduction in high school can be explained only by demographic reasons. In the municipality of Shabla there is no high school already! In the municipality of Silistra, which has the most densely educational infrastructure, the decrease was 2 times. Obviously, this is a huge, both qualitative and quantitative problem for schools.

Key words: Dobrudza, depopulation, school network

ETHNIC DIVERSITY LINKED TO DWELLING QUALITY ALONG THE ROMANIAN DANUBE VALLEY

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A characteristic feature of the Romanian Danube Valley is the ethnic, lingvistic and cultural diversity developed in the course of time. This diversitz shows in the wide range of the mobile and imobile heritage and the production of some creative models spread out throughout the danube Basin. In 2011, the 266 local administrative units (LAU2) in the Romanian Danube Valley numbered 238 communes, 28 municipia and towns and a population of 1.7 million inhabitants (2011). The highest percentage goes to the Romanian population (87.9%), followed by the Rroma (3.8%), the Turks (0.2%), the Russian-Lippovans (0.6%), the Serbs (0.3%), the Ukrainians and the Czechs (0.1% each).

The present paper approaches the complex issues of ethnic diversity and dwelling quality in the Romanian Danube Valley communities highlighting the territorial disparities at the LAU2 level. Ethnic diversity is assessed by the degree of population other than Romanian per the total population. Swelling quality is based on the assessment of three types of statistical indicators: dwelling stock (% of finished dwellings, % of finished dwellings per total number of dwelling-houses), dwelling development indicators (living floor/m^2 dwelling, living floor m^2/inhabitant, density of dwellings) and comfort indicators (access to drinking water, sewerage, electricity, etc.). Differences in the quality of dwellings in the Romanian Danube Valley are expressed by the Dwelling Quality Index (DQI). The study valorises the data-base for LAU 2 level, that is, the results of the Population and Housing Census (October, 2011) and of TEMPO Online, both data-sources being published by the National Institute of Statistics.

The results show a high degree of ethnic diversity and of the dwelling quality, especially in the Danube Gorge, Danube Delta and in some big towns (Tulcea, Brăila, and Drobeta-Turnu Severin).

Key-words: Romanian Danube Valley, ethnic diversity, dwelling quality, territorial disparities

CONSIDERATIONS ON INTERNATIONAL MIGRATION OF POPULATION FROM BOTOSANI COUNTY IN MADRID CITY (SPAIN)

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The purpose of this article is to analyze international migration characteristics of the population in Botosani who emigrated to the city of Madrid, after 1990. International migration from Botosani has produced a demographic transformation of the entire county level. Today is observed a beginning aging population in the eastern part of the county. In recent years, the birth rate and marriage is reduced, resulting a slight population decline. However, we can mention that, had it not intervened this international migration of incredible magnitude, the Botosani county would be faced with an obvious economic and social crisis.

Key words: international migration, temporary migration, Madrid city, labor force, Botosani county

INCIDENCE OF EXTRAMARITAL BIRTHS IN BORSKA AREA AT THE TURN OF THE CENTURY

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Borska area is situated in the most eastern part of Serbia, encompassing the broad border area between Serbia and Romania and Serbia and Bulgaria. It occupies the territories of four municipalities, Bor, Majdanpek, Kladovo and Negotin. This paper is focusing on particular features in the natural dynamics of population, with special regards to extramarital births, a phenomena well known in these parts for more than a century. Borska area, as well as the most of Eastern Serbia is a very unique and diverse space, with an abundance of geographic, strategic and social peculiarities, deeply rooted in the characteristic iconography of the area that engages various traditional and ethno cultural settings and beliefs, that still prevail in some aspects of socio cultural idiosyncrasy of the population. The time frame used in the paper includes the period of the last 20 years, a period so vibrant and specific in many respects, regarding profound and extensive shifts on the political and socio economic level. In order to establish the dynamics of extramarital births, within its distinct traits, in each of the four municipalities, as well as the area itself, along with the main features of complex developmental processes, through which is their occurrence insured, there has been used a set of statistical data, based on the documented charts provided by the Demography unit of the Statistical Office of the Republic of Serbia.

Key words: Borska area, municipalities, extramarital births

SERBIA IN A MOBILE WORLD: REFRAMING THE MIGRATION QUESTION

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The global migration trend has large impact on societies of sending and receiving countries. Growing proliferation of forms of migration (circular, mixed migration flows etc.) in the interplay of different drivers lead to methodological challenges in research. Furthermore, it calls for a raise of policymakers' awareness of implications that migration might have for society in the coming decades in order to develop and implement policies and strategies to prepare for the future.

Migration patterns in Serbia have changed from strictly controlled emigration after the World War II within former SFRY and temporary guestworker programme to liberal emigration. Nevertheless, Serbia has never had a complex migration policy as an independent country or as a part of former SFRY. The paper examines is there enough awareness in the political, economic, academic or general public about the importance of the migration phenomenon and the potential of integration of migration in different development programs of the country. Research is based on the qualitative findings of the focus group discussion on the impact of migration on the Serbian labour market as well as foresight exercise that involved three types of stakeholders: decision-makers, experts, and civil society representatives. The events were organized within SEEMIG project on the longer term migratory and demographic processes of the SEE area and their effects on national/regional economies, that included partners from Serbia, Bulgaria, Hungary, Romania, Austria, Slovakia, Slovenia and Italy. Findings points to that most of the participants of the events are not aware of immigration potential.

Key words: migration, migration policy, South-East Europe, Serbia

THE IMPLICATIONS OF URBAN REGENERATION IN TOURISM. CRAIOVA CITY AS A CASE STUDY

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Urban tourism has developed in recent years, being in full expansion due to the world-wide urbanisation and internationalisation of tourism services. The new economy implies also investments in urban regeneration in order to bring benefits and to improve the quality of life in the cities. The revitalization of urban space influences the urban environment and society and it is made only through coherent policies.

Previous studies showed the impact of the revitalization of places through urban regeneration on emotion, loyalty, satisfaction and support which led to tourist satisfaction and loyalty and further tourism development. But the regeneration has also negative effects such as gentrification, lack of the local community involvement and loss of the sense of place.

This study provides a critical and analytical approach of how urban places are transformed into identity and economic resources and into places of consumption for tourism purposes. Thus, the paper aims at analyzing the implications of this regeneration process within the urban design and tourism development framework, assessing the city morphology, the degradation process of the urban spaces, the relation between the cultural heritage and tourism, and the impact on the economic level and on the residents' life and activities.

Craiova, a former industrial city, has an important number of heritage buildings and unused industrial spaces which can represent a potential for tourism development. The current regeneration process focuses mainly on the promotion of commercial facilities and on the attempt to attract young professionals, tourists and students to the city. Craiova tries to discover in this way a new identity and to strengthen its role in the economic and social system of Romania.

Thus the future direction of city development involves an integrative approach of a proper urban revitalization and tourism development.

Key words: urban regeneration, urban revitalization, cultural heritage, urban tourism, Craiova

SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL PROTECTION IN THE REGION OF THE DANUBE THROUGH SERBIA, WITH A FOCUS ON TOURISM

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The paper starts by reference to the importance of the corridor VII for tourism development in the field of spatial planning and sectoral planning for tourism development. Based on the identified tourism resources, attractiveness of the Danube and its coastal belt, it can be concluded that it is an area of great tourist importance and value not only for Serbia, but for the whole of Europe. If we accept the fact that the potential attractiveness of tourism resources and facilities for tourists is still not achieved, it is clear that the prioritization of activation and implementation of sustainable development of tourism on the Danube through Serbia necessary step. Indeed, the paper points to the importance and possibilities of development of nautical tourism Danube sector in our country in order to achieve long-term advantage over competitors. The influence of local communities in tourism development of the area, width and depth of product range, attractive factors and the role of marketing in tourism development affect the overall picture of the past development. The paper suggests that priority should be to have the improvement of presentation and interpretation of the development of tourism resources for visitors to experience and the realization of its potential level of their attractiveness, accessibility and development activities on the Danube, but all under the protection of the environment.

Key words: Corridor VII, the attractiveness of tourist resources, differentiation of areas for tourism development, Criteria for determining priorities for the development of tourism, institutional and organizational arrangements

EVALUATION OF CHANGE IN TOURISM CLIMATE POTENTIAL IN HUNGARY

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Understanding of how climate change affects tourism industry and assessment of tourists and how they respond to that remains limited. Effectiveness of climate adaptation due to climate change and adaptive capacity of tourists remain largely in adequate and unexplored, as well. By identifying the quantitative impacts of climatic conditions and climate change on tourism, development of objective strategy building, decision-making processes, and planning for climate change adaptation can be facilitated. Our work aims at assessing the exposure of tourism sector to climate change basedon a tourism climatic indicator.

The tourism climatic potential and its future change are quantified with a modified form of the widely accepted Tourism Climatic Index. This quantity evaluates the suitability of a particular climate for general light outdoor tourism activities. The index was adjusted to the Hungarian climatic conditions expressing the seasonal subjective thermal assessment patterns of Hungarian residents. In the work, we provide some insight into the characteristics of climate potential through present measured data for some popular tourist destinations located in Europe as well asbased on present observational data and projected regional climate model outputs for the area of Hungary.

The results indicate that the most pleasant climatic conditions for outdoor tourism purposes occur in spring and autumn while conditions are less favourable in summer. Tourism climate conditions will likely to improve in the shoulder months; however, deterioration will be probable in summer, with still remaining at least acceptable conditions fortourism purposes.

The outcomes are established in the datasets of the National Adaptation Geo-information System developed in Hungary and are available publicly for users from May, 2016.

Key words: tourism, climate potential, climate change, Tourism Climatic Index

SUSTAINABLE DEVELOPMENT OF TOURISM AND PROTECTION OF THE DANUBE CORRIDOR – RELATIVIZING THE CONFLICT OF INTEREST

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The sustainable spatial development of the Danube corridor must be integral and directed towards harmonizing the impacts of different and special purposes of the area, i.e. harmonizing the conflicted interests. The special purpose area spatial plan created for this part of the Danube corridor envisages the development, regulation and protection of the river Danube as a waterway, before all, but also as an aquatic, ecological, cultural and tourist corridor. The need for an integrated development of the Danube corridor in terms of its infrastructure, economy, tourism, and culture is seen as the country's priority. The Republic of Serbia also insists on other forms of integration of the corridor in both European and local development trends, bearing in mind significant regional disparities along the corridor. Another priority of the planning and regulation of this waterway is integrated regional and local development of the riversides communities, with an adequate system for managing the environmental protection and development, as well as with regional and cross-border cooperation projects. Because of high concentration of protected objects of cultural heritage, their historical and cultural connections, and the natural values of that area, the part of the Danube corridor passing through the territory of Serbia represents a starting point for the preservation of this waterway's identity and its surroundings. The protected areas, which are the part of the „ecological and historical zone" of the Danube, are singled out as highly valuable and unique tourist zones. The paper offers general guidelines for overcoming the limitations for development, especially those seen from the point of rational planning and usage of the Danube corridor, the development of tourism and the preservation of ecologically endangered habitats, cultural heritage and landscapes. Basic conflicting impacts of the Danube corridor and the development of tourism on the renewable usage of natural and man-made resources, together with the principles for their resolution, are shown here on the example of the part of the Danube that flows through Serbia.

Key words: sustainable development, tourism, protection, the Danube, relativization

RAMSAR SITES IN VOJVODINA AS DESTINATIONS OF SUSTAINABLE TOURISM – PLANNING AND DEVELOPMENT

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Since the expansive and uncontrolled development of tourism last few decades has caused the emergence of many unwanted environmental, social and cultural consequences, this has led to the fact that the development of tourism must be placed under the wing of sustainable development, which is the only way to reduce environmental degradation, as a basis for tourism development, and preservation of tourist attraction for future generations. Planning and development of tourism, especially in the case of sensitive natural resources that are represented in the Ramsar sites, must be based on the principles of sustainability, in order to prevent degradation and enhance their conservation. Bearing in mind that tourism in the Ramsar sites of Vojvodina is in the initial stage of development (except Zasavica, Obedska bara and Stari Begej-Carska bara, which have already built tourism image) it is clear that it can access the proper planning and development of these areas, and from the same place create destinations of sustainable tourism. The construction of adequate infrastructure and superstructure, which would be integrated into the natural environment, good marketing and responsible management of these areas, one could talk about sustainable tourism, and the Ramsar sites of Vojvodina as a sustainable tourism destinations.

Key words: Ramsar sites, Vojvodina, sustainable tourism

TOURISM IN THE AREA OF SPECIAL NATURE RESERVE "DELIBLATSKA PEŠČARA" (SERBIA)

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The largest European continental sands have been under protection from the 1977. The main value of this internationally multiply protected area are mosaic deployed sandy, steppe and forest ecosystems, with accompanying richness of biodiversity, which in addition to distinctive dune relief make this area a valuable scientific polygon. These ecosystems are also important as natural tourist values that could be used, together with present cultural values, for organisation of various forms of tourism. Because of the protected area's nature, main emphasis in this paper is laid on the importance of ecotourism development, as a form of responsible tourism friendly to nature, which employs local people and improves their quality of life. A group of indicators, defined by the World Tourism Organization, has been analyzed, and the basic characteristics of eco destinations have been set. The vulnerability of area from natural disasters has also been studied, specifically the issue of forest fires, as one of the major problems for the future organization of tourism and nature conservation.

Key words: ecotourism, nature conservation, forest fires, Deliblatska peščara

RURAL TOURISM AND AGRITOURISM: AS DRIVER OF THE SUSTAINABLE RURAL DEVELOPMENT IN THE LOWER DANUBE BASIN AREAS. PROPOSAL FOR CROSS-BORDER COOPERATION STRATEGY

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The agro-tourism and rural tourism joitly with the local food and rural gastronomy can be considered the potential main driving forces in developing multifuncionality of agriculture and parallely improving sustainabilty of rura lareas. Following this approach, itispossible to elaborate and discuss a cross-border sustainable rural development strategy to be implemented in the Lower Danube Basin Areas. This strategy is harmonizeded with the roadmap represented by the Sustainable Development Goals 2015–2030 (Transforming our world: the 2030 Agenda for SD), the Paris Agreement of the COP21 – UNFCCC, the Europe 2020, the CAP 2014-2020 as well as the Agenda of the Circular Economy proposed in 2015 by the EU.

In this paper the authors will provide well-understanding of the contents of agro-tourism and rural tourism with highlighting the new paradigms for the 21th Century. The paper will analyse the state of art, the structure, the major actors as well as processes and synergy of local food chains and tourism. To demonstrate the reality the paper will present examples and case studies from Italy and Hungary referring also research results from joint international S&T projects. It will also comprise a proposal for an international cross border strategy concerning the Lower Danube Basin Areas based on an approach of Smart Communities and Smart Land and the Instrument in scope of CLLD (Community Led Local Development) of EU2020 strategy.

The paper can contribute to generate new knowledge on prerequisites and conditions for developing entrepreneurial capacities of agriculture and tourist sector as well in order to increase the level of utilization of natural resources in this relevant cross-border region. It helps to improve cooperation between partners in Lower Danube Basin Areas. The proposed strategy can be utilized for initiating and establishing joint projects and improve cross-border cooperation.

Key words: Rural Tourism, Agritourism, Rural Development, Local Food Chain, New Paradigms of Development

BULGARIAN LEGISLATION ON TOURISM COMPLAINTS – GUIDELINES FOR UPDATE

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Effective complaint handling in tourism has a positive impact in the form of building customer loyalty and generating financial benefits for tourism business. On the other hand, tourist complaints might be a major source of information for regulatory authorities about the state of tourism and the key areas that need to be improved. The regular collection and analysis of the information about the registered complaints is a useful practice for identifying problems and possible solutions in terms of implementation of tourism legislation. Complaint management in tourism business presumably has to be consistent with the legal framework in Bulgaria, and respectively in the European Union.

The changing environment in which tourism business has to operate determines the need for update of tourism legislation, especially in the part relating to the protection of consumer rights. These changes are necessary due to the detection of some discrepancies in Bulgarian legislation which are to the detriment of travelers as well.

The purpose of this paper is to emphasize the need for change in the current legal framework in tourism. This will be achieved by tracking the complaint handling procedures; revealing some restrictions affecting essentially consumer rights; reviewing the forthcoming harmonisation with the newly- approved changes in the European tourism legislation and outlining some key principles which might serve as a base for a more effective complaint handling legal procedure.

Key words: tourism legislation, restrictions, update, complaint handling, key principles

CONTEMPORARY PROBLEMS AND PERSPECTIVES IN THE DEVELOPMENT OF URBAN TRANSPORT IN SOFIA

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For the development of the economy of any city it is extremely important the improvement of its transport system and transport infrastructure. The latter serves as a kind of "circulatory system" of all big urban systems. According to National Statistical Institute in 2015 Sofia had a population of 1,26 million residents, while transport infrastructure was planned for two times less inhabitants. In addition, the city has over 500 thousand vehicles, which creates a number of problems faced by all public authorities of Sofia Municipality. This major problem requires an integrated approach to adaptation and optimization of transport infrastructure, particularly public transport in the context of ever-increasing population. Some of the most important projects for the reorganization and improvement of transport within the municipality are the following: The project for construction of Sofia 3-re Metrodiameter, The project for integrated urban transport, The renovation and construction of the Sofia ring road, The project for reconstruction and expansion of key boulevards and others. They all seek to ease traffic, to reduce travel time, the diminish emissions of pollutants and noise, to create an attractive, more comfortable and more environmentally friendly public transport for residents and visitors.

The purpose of this article is to reveal the recent problems and trends in the development of public transport in Sofia and suggest ideas for more efficient and sustainable urban transport in the Bulgarian capital.

Key words: transport, infrastructure, problems, perspectives, transformations

CYCLING TOURISM ROUTES AS INSTRUMENT FOR REGIONAL DEVELOPMENT AND TRANS-NATIONAL COOPERATION WITHIN THE LOWER BASIN OF THE DANUBE

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Cycling tourism is gaining attention as a form of sustainble tourism offering the opportunity to travel long-distances with minimum carbon impact on the environment. Cycling routes connect different regions and may extend from local to trans-national scale covering vast territories and unifying them under various themes. Danube cycling route is part of the trans-European network of cycling routes (EuroVelo) and within the Upper basin of the Danube is a successful tourism product.

Being identified by the European Union cycling tourism development is a newly introduced priority with a strong potential for generating trans-national relations between different stakeholders. As a result a number of cross-border and transnational projects have been implemented with the financial support of EU funds. The current paper aims at providing of overview on projects that address long-distance cycling routes development within the Lower Basin of the Danube. A study on identified project's objectives and results is used to define the current status and future opportunities for cooperation between stakeholders involved in cycling tourism development.

Key words: sustainable mobility, cycling tourism, regional development, trans-national cooperation

THE RIVER AS A SUSTAINABLE ATTRACTION WITHIN THE OFFERING OF RIVERSIDE HOTELS LOCATED IN CITIES OF THE DANUBE'S LOWER BASIN

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Suitability for spending leisure time in a pleasant manner is one of the lodging selection criteria even in cases when one travels in an official capacity. This is even more true for selecting the temporary home for leisure travels. In accordance with „edge effect", forests and areas next to bodies of water are the most suitabe for recreational purposes. The attractiveness of the river and riverside is heightened by the visual appeal of bridges and waterborne traffic. From the aspects that comprise hotel offerings, location is the most vital since it alone is the one that can not be changed during operation. Important factors besides location are traffic connections and the range, quality and price of offered services.

The results of the research presented on the Third Romanian-Bulgarian-Hungarian-Serbian Conference in 2014 revealed the following:

the riverside hotels in Danube-side capitals are generally members of hotel chains.

in hotels built on the riverside, size-efficient corridor layout design was a more important factor than the view offered by the rooms.

the value of the location appeared in the room price, meaning that riverside hotels are more expensive than their inland competitors.

This paper examines whether the same results can be found in the case of riverside hotels established in Danube-side cities in the river's lower basin. The hypothesis of the research is that riverside hotels in the Lower Basin of the Danube are not chain hotels but independent ones. On the other hand, in the case of size efficiency and pricing it is expected to find the same result as with hotels in Danube-side capitals.

The research includes hotels where the view of the Danube is not fully obstructed by continuous developed area.

The secunder method of gathering the necessary information needed for relevant answers related to the the hypotheses is the overview of vocational literature pertaining to the development and operation of international hotel industry. The primary methods are the definition of relevant hotels, surveying them electronically and via phone as well as content analysis of their websites.

Key words: Danube, hotel, attraction, location, view

THE STRUCTURE OF AGRI-TOURISTIC MODEL FOR SUSTAINABLE DEVELOPMENT OF LOCAL COMMUNITIES ALONG THE DANUBE BETWEEN OSTROV AND TOPALU, ROMANIA

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This study aims to define the agri-touristic specific of the Romanian sector of the Danube in Southern Dobrogea, between Ostrov and Topalu villages, and to integrate the existing resources in touristic routes, in order to assure sustainable development of rural communities from this area. Research methodology consisted in bibliographic documentation, field research to discover villages with diverse natural and cultural heritage and to identify capitalizing opportunities for those in tourism, touristic resources mapping and identification of agri-touristic programs along the Danube between Ostrov and Topalu villages. Being a less developed area of South-Western Dobrogea, the study seeks the elements of sustainable development, relying on environmental factors, diverse agricultural potential and cultural heritage resources. All these can support capitalization of touristic potential in various forms: wine tourism, api-tourism, fishery tourism, gastronomy tourism, leisure tourism, eco-tourism, religious tourism, cultural tourism. By associating local socio-economic factors with natural resources and cultural heritage opportunities, the study proposes an agri-touristic model. This is based on the principles of sustainable development and is materialized in a series of touristic routes along the Danube. The routes are directed to agriculture and fishery and complementary with elements of transport infrastructure or tourism industry, as aspects of socio-economic integration of this Danubian area.

Key words: agri-tourism, Danube, route, rural, sustainable

SUSTAINABLE TOURISM POLICY, PLANNING AND DEVELOPMENT IN VIEW OF THE DANUBE STRATEGY

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The Romanian society is undergoing a changing process where all the economic, social, political, civic elements have known a new dynamics while trying to adapt to the current conditions.

During this transformation we cannot ignore the public administration system from our country, the other institutions that contribute to the development of Romania.

The need to introduce a managerial dimension, the professionalism in this field is justified by the desire of our country to harmonize the European standards for the sustainable integration into the EU.

Starting from the premise that an integration of the regions is more efficient and more realist than the integration at a national level, Romania must revaluate this opportunity, adapting the institutional abilities, mobilising the political factors, coordinating the decision levels, and, last but not least, encouraging the civic involvement. The regional development, thus, depends directly on these factors, so does tourism.

The European Union Strategy for the Danube Region (EUSDR) is a community tool for macro-territorial cooperation, involving 14 EU states and Danube states.

We should not ignore the economic and financial aspect of the Danube Strategy implementation. European money is made available for the development of the South-West Oltenia Region, and Danube Bend destination, especially for infrastructure improvement and tourism development.

Key words: tourism, planning, strategies, policy, sustainable, destination

THE EUROGITES STANDARDS' ROLE IN EVALUATION OF AGRITOURIST SERVICES – THE CASE OF SERBIA

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The paper presents conceptual terms of agritourism through connection with the criteria of quality of services. Based on best practices and experiences from the European countries, the European Federation of Rural Tourism (EuroGites) has established common quality assessment standards for accommodation units in rural areas. Criteria of established standards are grouped in five clusters: equipment, surroundings, services at the accommodation and its surroundings, non-material aspects and security. The aim of the paper is to analyses comparison between the minimal conditions for international and domestic markets, through the assessment of the agritourism quality segments. The research has been conducted in the selected village settlements in Vojvodina Province (Northern Serbia) by using EuroGites methodological instrument. The main hypothesis of the paper was based on the estimation that quality of agritourism in Vojvodina Province is measurable by comparing the fulfillment of the EuroGites criteria in the domestic and international level. The results showed that the three sub-hypotheses are confirmed, and two of them are disproved. The research findings represent a useful tool for obtaining information about many aspects of quality in agritourism and, with slight modifications, it can be used in various areas of quality research.

Key words: agritourism, EuroGites, criteria clusters, quality segments, Vojvodina Province (Noerthern Serbia)

A HOLISTIC APPROACH OF AGRITOURISM DEVELOPMENT ANALYSIS

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A paper deals with conceptual guidelines, basic aspects and spatial frameworks of agritourism development. The holistic approach, in this regard, includes the connections with integrated and comprehensive aspects of tourists' stay in a country side. The authors defined the impact of agritourism on rural surroundings and analyzed the influence of spending leisure time outside urban areas, through the co`nsuming of agritourism activities. The understanding of overall components of the phenomenon of agritourism is essential for future planning, management and making business decisions and strategies. For successful business in agritourism it is necessary to have knowledge in numerous economic fields. Every field of knowledge can also be an aspect of agritourism, which necessarily includes: organization, management, marketing and other economic aspects. Together with these, the paper emphasizes products and services in agritourism and gives an insight into the facilities and opportunities, which are offered to tourists in rural areas. The research findings represent a useful tool for obtaining information about many elements of agritourism development and it can be very useful tool whether regarded as a travel industry research or an academic field of investigation.

Key words: agritourism, comprehensive frameworks, products and services, tourism impact

COMPETITIVENESS OF TOURISM DESTINATIONS. OLTENIA (ROMANIA) AS CASE STUDY

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The competitiveness concept is quite vast, referring both to products, companies or different economic activities. The competitiveness of European tourism is directly linked to sustainability, including both comparative and competitive advantages. The paper analyses the primary tourist offer, cultural attractions and human resources as well as infrastructure and investments into tourism as the main comparative advantages. Among the competitive advantages, the management of tourism companies and national and regional strategies for tourism development were given special focus.

The most important investments were made through the Regional Operational Programme for the upgrading and enlargement of accommodation and treatment facilities in Baile Olanesti, Calimanesti and Govora balenoclimateric centres.

The paper concludes that in order to become a competitive tourism destination, the regions should adopt a strategy focusing on cultural tourism (rural, religious and event tourism) as well as on health tourism, since Oltenia is known for mineral and thermal springs, but emphasizing the activities for leisure time and the wellness tourism. These massive investments may help boost tourism in Oltenia region as long as there will be a coherent marketing strategy and pervasive and persuading publicity campaigns.

Key words: tourism attractions, competitive advantages, tourism development, tourist destination

EDUCATION THROUGH EXCURSIONS IN THE FUNCTION OF SUSTAINABLE DEVELOPMENT OF TOURISM IN THE CASE OF NATIONAL PARK ĐERDAP

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Excursions represent specific aspects of tourist movement that are related to the traveling of a group of people, usually for fun but also for educational purposes, when it comes to pupils and students who are traveling. Creating thematic excursions in the territory of the national park Đerdap with special emphasis on the attractive parts of protected area of the national park, among which there are natural and anthropogenic tourist potentials, contributes to raising the level of awareness and knowledge of possibilities of sustainable development of tourism. The Đerdap Gorge, the Danube River, Lepenski vir, Golubac, the remains of Trajan's bridge, Trajan's board (tabula Traiana), the Roman limes, the preserved richness and diversity of flora and fauna, are just a part of the tourist attractive motives that fit excursion tourist product of the Đerdap National Park and thus attract visitors. Apart from developing interest in the protection of the environment and acquiring traveling habits, as well as the introducing adequate ways of staying and behaving in the national park Đerdap, the participants in excursions educate themselves indirectly, through this type of traveling, about the values of the national park, as well as the importance of specific forms for the sustainable development of tourism in the territory of Đerdap.

Key words: excursions, tourism, Đerdap, sustainable, development

USING THE EXPERIENCE OF NATURAL PARK SPESSART, GERMANY, FOR THE MARKETING OF GEOLOGICAL HERITAGE AT THE ASPIRING GEOPARK BELOGRADCHISHKI SKALI

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Natural Park Spessart, Germany and the aspiring Bulgarian Geopark Belogradchishki skali have a lot in common regarding their geological structure, their geography and their regional characteristics.

Natural Park Spessart is an already established institution with a wide range of activities including regional tourism in geologically interesting places interwined with the identity of the region itself. As a young institution, the Geopark Belogradchishki skali could take this experience and transfer it to the tourism landscape in the region of Belogradchik, Makresh and Dimovo.

Some of the best practices the aspiring Bulgarian Geopark could take from the Natural Park Spessart are the certification of guides and the publication of an annual programme with events. There is also a lot to be done in the respect of marketing at the aspiring Geopark such as defining its target group, letting it know about the natural and cultural wonders of the region and, last but not least, creating the very infrastructure for tourism. There are also a lot of adjustments to be made due to the lack of interest to tourism from locals.

Although, the German park has its focus on vegetation and the animal kingdom, it being an old institution with decades of experience could give a boost of ideas on the management of the aspiring Geopark Belogradchishki skali.

Key words: Spessart, Belogradchishki skali, geotope, marketing

SUSTAINABLE TOURISM DEVELOPMENT WITHIN THE DISTRICT OF VIDIN – KEY DEVELOPMENT CATEGORIES AND FACTORS

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The main objective of this abstract is to underline the key categories with a significant impact for the sustainable tourism development within the district of Vidin.

The region is characterized by rich natural and cultural heritage. The district has a great potential for the development of different traditional and alternative types of tourism: cultural and historical, natural, religious, hiking, biking tourism, etc. This potential can be assessed as insufficiently utilized.

The availability of sites and attractions of tourist interest is not the only prerequisite for the tourism sector development. We can define the following main categories with regard to the possibility for utilization of tourism potential of the territory:

Transport accessibility. The transport system plays a crucial role in the implementation the principles of sustainable mobility in tourism. Leading position occupy the transport opportunities of tourists „from", „to" and „within" the destination.

Development measures: Promoting the sustainable means of tourist mobility, including sustainable self-mobility (bicycle routes, walking).

Basic, additional and accompanying tourism services. Includes different services for providing animations, attractions and additional entertainment for tourists and has high importance for the quality of tourist services and the satisfaction of the tourists of their stay.

Development measures: Providing high quality tourist services and animations with positive effect on the overall attractiveness of the region.

Tourist awareness and knowledge. This category reflects the close relationship between the tourism sector development and the key category accessible information.

Development measures: Providing quality and current information that can be helpful to tourists before and during their stay in the destination.

Key moment in the development measures implementation is reporting environmental impacts.

The tourism sector should be considered as a system (chain of tourist services). Optimal conditions for its development can only be created in parallel consideration of the impact of various elements in the system.

Key words: development measures, transport accessibility, tourism services, tourist awareness, chain services

GUIDE TO THE SELF-EVALUATION OF TEACHING ACTIVITIES AND SCHOOL ACTIVITIES AS AN INSTRUMENT OF EDUCATION QUALITY IMPROVEMENT

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The establishment of evaluation quality and of the process of self-evaluation of teaching and school activities in Serbia is going through its initial phase, unlike the European countries, where those processes have already passed that phase. Things that are often used in the process of self-evaluation are aids, such as various guides that are results of long-lasting and detailed studies in which a great number of people participated. The international practice shows that self-evaluation guides are present in economically developed countries and that their existence is more than justified.

The goal of this paper is to determine advantages and disadvantages of the Guide to the self-evaluation of teaching activities and school activities as an instrument of education quality improvement, and also to ascertain the attitude of geography teachers about the importance of self-evaluation and about the importance of geography teaching improvement. A survey research was conducted in 24 schools in urban areas. Results of the research have shown that the current guide is an instrument of education quality improvement to a small degree. Geography teachers are mostly familiar with the process of self-evaluation, but they are rarely a part of the expert team that delas with those problematics. Self-evaluation of teaching activities is really a measure for the enhancement of education quality, of the quality of teaching and geography teaching according to the geography teachers who participated in the survey. Results of the self-evaluation of every teacher's work should represent a course in which all identified 'weak points' should be analysed separately and solutions for their improvement should be seeked.

Key words: Self-evaluation, Education, Primary and secondary schools, Geography, Serbia

AN OPTION FOR CREATIVE DIDACTICAL MODELING IN TEACHING GEOGRAPHY – CASE-STUDY

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The contemporary social needs (and expectations) towards school geography suggest heterogeneity of didactical modeling by which geographical knowledge is interpreted.

That is the cause this study to be channeled towards proving the didactical benefits of applying one of the most complex variants for adapting social significant problems to the aims of educational space – the geographical case-study. They are concretized through possibilities for illustration of real or typical situations from reality for educational goals; skillful presentation of thematic organized information; the objective possibilities for analysis, conclusions and prognosis of the described events through usage of concrete geographical facts; provoking of analytical thinking and finding multivariant solutions; the opportunity to be evaluated the suggested objective solution by learners.

This research proves the validity of using case-study as a didactical tool which gives the opportunity to be formed depth of knowledge in relation to state defined requirements towards the education of geography and economics, and learners' ability and creativity to use case-study in different scientific disciplines.

The suggested theoretical approved model is connected with the possibility for appliance of geographical approach for solving significant problems. The focus is put on personal motivated learning and cognitive activity of pupils.

Key words: geographical education, pattern, case-study, didactics in geography, active learning

CONTEMPORARY EDUCATIONAL POTENTIAL OF THE "REGIONAL DEVELOPMENT AND GEOECONOMICS" DEGREE AT THE "ST. CYRIL AND ST. METHODIUS" UNIVERSITY OF VELIKO TARNOVO

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The curriculum of the "Regional Development and Geoeconomics" degree is developed according to the European and National Qualifications Framework, the main normative base and the methodical standards, approved by the structures of the VelikoTarnovo University, authorized with the respective powers.

The qualification characteristic of the degree determines as basic purpose of its educational process the training of highly qualified specialists in regional development and geoeconomics.

The getting of personal competencies presumes: the mastering of new knowledge and constant improving of qualification; the making of particular scientific conclusions in the field of Geography, Geoeconomics and Regional development, based on empirical researches; development of analytic, constructive thinking and critical capability of observation; development of the capability of administrative management of sophisticated professional activities.

The professional competencies presume the students to: analyze and evaluate the natural resource potential, the demographic and economic potential of the administrative and territorial units of different ranks; evaluate the contemporary condition of the settlement network and the infrastructure on national, regional and local level; identify the problems of regional policy in Europe, the Balkan Peninsula and Bulgaria, and to formulate the priorities for their overcoming; participate in development and realization of strategies, plans and programs for development on national, district, municipal and settlement level; work in teams in the process of development of geographic projects and projects in regional policy, in the conducting of field practices and presenting of the results.

Fundamental, general theoretical and applied practical preparation, which provides integrative and interdisciplinary knowledge.

The built cause-and-effect rela-

tions between the theoretical and the practical applied disciplines give the ground for successful understanding and rationalization of the geographic image of the world. On this base students can upgrade their knowledge on disciplines with regional focus and help the studying and the successful application of different regional policies on local level.

Key words: education, regional development, Geoeconomics, competencies

"CUBE JENA" – ABOUT THE PERSPECTIVES IN GEOGRAPHY EDUCATION

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Geography education in Bulgaria finds itself at a new stage of development. Although the main priority guidelines for problematization, socializing, humanizing and technology provision of geography education were set in 2000 (in Strategy for geography education), still they are not entirely put in practice. Considering that our educational system is part of European one we could derive experience from it and especially from German speaking countries with well-developed educational systems.

The main aim of paper is to analyze the concept "Cube Jena" which implementation and adjustment in Bulgaria will be useful in two main areas:

In didactical and methodological aspect the concept can be used as basis for the introduction of "key problems" of contemporary society in geography curriculum and they are the main research object (and goal) of geography education in secondary schools and universities.

The concept proposes the steps for planning and implementation of problem-oriented educational process in geography training.

Key words: key problems, geography education, perspectives

COMPARATIVE SITUATIONAL ANALYSIS OF THE GEOGRAPHY OF SOUTH EAST EUROPEAN COUNTRIES IN SECONDARY EDUCATION

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One of the characteristic features of contemporary education is its globalization. Up to the present moment it is necessary to form a conceptual theoretical-constructive model of geographical education in three aspects: consistent, functional and technological, as well as to establish respective modules that stimulate the creation of an environment for learning.

The comparative situational analysis of the education on Geography of countries includes the following countries – Republic of Albania, Republic of Bosnia and Herzegovina, Republic of Greece, Former Yugoslav Republic of Macedonia, Republic of Romania, Republic of Slovenia, Republic of Serbia, Republic of Turkey, Republic of Croatia, Montenegro. Simultaneously, a parallel comparison to the geographic education was made.

By preserving the national tradition, education is synchronized with new European standards which require that at the end of their education young people acquire key competences at a level which prepares them for the life of adults and creates a basis for future education and professional life.

Contemporary social realities form a new perspective towards the value of geographic knowledge and cognition, the significance of geographic erudition as a part of general knowledge and a style of social behaviour.

New accents and dimensions are being established which requires profound research and reflection upon the achievements of geographical education in our country as well as the necessity to form new philosophy for its development.

The consistent-structural analysis covers only the obligatory training of geographical education during upper secondary level and a comparative characterization of up-to-date curricula to the new academic year was made.

The comparative analysis covers the following educational indexes: place of the discipline Geography of countries at upper secondary level of education, duration of systematic education in Geography of countries, structure and content, aims of education, total academic hours accord-

ing to curriculum, scale of the cultural-educational field, etc. These educational indexes have been classified and arranged in groups after they were analyzed.

The implemented comparative analysis of the discipline Geography of countries aims at the enrichment of the methodological literature of comparative geographical education as well as at suggestions for improvement of geographical education through foreign experience which would be significant for the theory and practice of the comparative geographical education, for making decisions in the field of education policy of one's own country.

Key words: curriculum, geography education, Geography of countries, comparative situational analysis

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