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BOOK of ABSTRACTS

GREEN DEVELOPMENT,
INFRASTRUCTURE, TECHNOLOGY

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GREEN INFRASTRUCTURE,
GREEN TECHNOLOGY**

BOOK OF ABSTRACTS

Skopje, 22 – 25 March 2018

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TABLE OF CONTENTS

INVITED LECTURES AND KEY SPEAKERS

il-01 – Massimo Zucchetti, Raffaella Testoni Models and scenarios for energy and emissions planning	23
il-02 – Mile Dimitrovski Overview of Skopje air pollution – Rare case	24
il-03 – Trajče Stafilov Heavy metals pollution studies in different environmental media in the Republic of Macedonia	25
il-04 – Caner Zambak Safety and security of water quality and resources	26
il-05 – Mariana Golumbeanu, Alina Daiana Spînu, Laura Alexandrov, Magda Ioana Nenciu, Tania Zaharia, Razvan Mateescu, Elena Vlasceanu, Mihail Costache Implementation of the new methods for the improving maritime policy in the romanian costal area	28
il-06 – Dame Dimitrovski Household heating on solid fuels as a source for urban air pollution in Skopje	30

ORAL SESSION

1

AIR – WATER – SOIL POLLUTION, SUSTAINABLE DEVELOPMENT

o1-01 – Mihail Kochubovski, Jordan Janevski, Gjulten Zendeli Air pollution by heavy metals in Skopje	33
o1-02 – I. G. Breabăn, E. D. Bobric Modelling the spatial variability of urban air quality affected by road traffic	34
o1-03 – D. Mirakovski, M. Hadzi-Nikolova, I. Boev, T. Sijakova, A. Zendelska, N. Doneva Sources of urban air pollution in Macedonia – Behind high pollution episodes	35
o1-04 – M. Laks, D. Stefanovski, J. Dimzova, D. Gusheski Carbon monoxide and nitrogen oxides emissions from boilers with thermal power lower than 3 MW	36

Table of contents

o1–05 – B. Balabanova, T. Stafilov, R. Šajn Longtime geochemical evaluation of anthropogenic element's distribution in the air using deposited attic dust	37
o1–06 – M. Hadzi-Nikolova, D. Mirakovski, N. Doneva, A. Zendelska Noise pollution – Agglomerations vs small urban areas	38
o1–07 – D. Vasovic, J. Malenovic Nikolic, G. Janackovic, Z. Vranjanac, S. Stankovic Ecological status assessment vs. specific pollutant load: Is it the missing link?	39
o1–08 – Ž. Vranjanac, D. Vasović, G. Janačković, J. Malenović-Nikolić, D. Dimitrovski Comparative analysis of selected environmental indicators within adjusted savings in Serbia and Macedonia	40
o1–09 – N. Živković, Ž. Vranjanac, A. Đorđević, D. Vasović, D. Dimitrovski Contribution of CO ₂ , no and PM _{2.5} particles emission to global atmospheric pollution: a comparative analysis of eu and Western Balkan countries	41
o1–10 – A. Angjeleska, E. Dimitrieska-Stojković, R. Crceva-Nikolovska, Z. Hajrulai-Musliu, B. Stojanovska-Dimzoska, S. Bogoevski, B. Boškovski Distribution and origin of some radionuclides into corn (as animal nutrition) and soil samples, from different locations in the Skopje valley	42
o1–11 – Majlinda Daci-Ajvazi, Bashkim Thaçi, Nexhat Daci, Salih Gashi Evaluation of an fixed-bed adsorption column for removal of lead, cadmium and zinc using different biosorbents	43

ORAL SESSION

2

**SUSTAINABLE DEVELOPMENT,
RENEWABLE ENERGY RESOURCES
AND MANAGEMENT OF NATURAL RESOURCES**

o2–01 – Kapila Liyanage Holistic and integrated approaches to sustainable operations and supply chain management	47
o2–02 – D. Dimitrov, A. Iliev, S. Nikolova-Poceva, A. Caushevski, V. Fushtik, N. Kiteva-Rogleva Variation of grid-connected photovoltaic systems electricity generation in the Balkans region	48

Table of contents

o2-03 – J. Djokikj, T. Kandikjan Sustainability aspects of additive manufacturing	49
o2-04 – B. Shabani, V. Dukovski Reverse engineering and additive technologies in circular economy	50
o2-05 – I. Selim, T. Kandikjan, A. M. Lazarevska End-of-life analysis of biodegradable plastics for industrial design purposes	51
o2-06 – Maja Mitevska, Richard Wood, Ana M. Lazarevska, Zoran Markov Production and consumption based approach in analyzing international energy spillovers and its relation to development	52
o2-07 – F. Judy, Y. Kurucu Modeling and evaluation of water demand and supply (Case Study Küçük Menderes Basin in Turkey)	53
o2-08 – D. Hazar, K. Velibeyoglu Sustainable management of rural-ecological commons: recommendations on edpsir causal networks	54
o2-09 – D. Jitariu, O. Oprişan, G. Croitoru, V. O. Robescu, I. Dorin, C. Tileaga Efficiency of the risk management process in the projects for the growth of competitiveness of agricultural holdings at the level of private organizations	55
o2-10 – Z. Ozcam, D. Hazar Wind farm conflicts at rural-ecological commons: case of pastures in Izmir	56
o2-11 – R. Salvia, G. Quaranta Multifunctionality and neo-productivism: An aporia for rural areas?	57
o2-12 – R. Biocanin, S. Ketin, B. Kostic, K. Borojevic Animal manure as biofuels in agriculture	58
o2-13 – Biljana Đorđević, Zoran Todorović, Dragan Troter, Ljiljana Stanojević, Dragan Cvetković, Jelena Stanojević, Vlada Veljković Application of deep eutectic solvent in extraction of Black mustard (<i>Brassica nigra</i>) seed oil	59
o2-14 – Ljiljana Stanojević, Zoran Todorović, Katarina Stanojević, Jelena Stanojević, Dragan Troter, Dragan Cvetković, Biljana Đorđević The effect of eutectic solvent choline chloride: glycerol on the composition and antioxidative activity of rosemary (<i>Rosmarinus officinalis</i> L.) essential oil	60

Table of contents

o2–15 – Marija Stevanović, Dragan Cvetković, Ljiljana Stanojević, Bojana Danilović, Jelena Zvezdanović, Sanja Petrović, Jelena Stanojević, Milorad Cakić Synthesis and biological activities of silver nanoparticles stabilized by aqueous extract from strawberry (<i>Fragaria x ananassa</i> Duch.) leaves	62
o2–16 – Stefan Trajkov Measurements and calculations from an installed PV/T solar system in the kindergarten “Pavlina Veljanova” Kochani	64
o2–17 – N. Kart Aktaş, N. Yıldız The effects of urbanization and human activities on basin ecosystem: Sapanca lake basin	65

ORAL SESSION

3

HEALTH AND ENVIRONMENT, LEGAL FRAMEWORK – GIS AND REMOTE SENSING CONTROL

o3–01 – Dejan Krstić, Nikola Trifunović, Darko Zigar, Jelena Malenović Nikolić, Nataša Šelmić Milosavljevic Change of natural magnetic field in bed as a cause for health impairment	69
o3–02 – S. P. Ozkan, F. Senol Planning for green areas in contemporary “Park-poor” neighborhoods: A spatial equity-based approach using geographic information systems, Izmir case (Turkey)	70
o3–03 – Fatma Şenol, İlgi Atay Kaya, H. Engin Duran Physical attributes of urban green areas affecting “Marginalized” groups access to healthy environments i n walking distance: A case of Izmir (Turkey)	72
o3–04 – Nevenla Velickova Cellular and molecular alteration as biomarkers for xenobiotic exposure	73
o3–05 – Stelios Xanthos, Fokion Leontaris, Alexandros Clouvas Finding orphan radioactive sources in scrap metal loads.	74
o3–06 – A. Enea, Gh. Romanescu, C. C. Stoleriu, M. Iosub, I. G. Breabăn Automatic delineation of sub-basins from elevation layers in GIS, based on horton-strahler hierarchical system	75
o3–07 – M. Palevic, B. Milisavljevic, Z. Spalevic, B. Rapajic, V. Spalevic Environmental Responsibility of Member States of the European Union	76

Table of contents

o3–08 – S. R. Berinde	
Assessing the room for growth in the case of accommodation businesses from Romanian hospitality industry	77
o3–09– S. Mitrova	
Performance comparison of different fuel cell technologies	78
o3–10 – Marko Dimitrovski, Vancho Donev	
Analytical synthetic analyzing in defining riteria, sub-criteria and alternative solutions for multicriterial modeling for investment decisions.....	79
o3–11 – Vancho Donev, Marko Dimitrovski	
Ranking the criteria for multicriterial modeling and presentation on results when making investment decisions.....	80

ORAL SESSION

4

**AGRICULTURE, FORESTRY, AGRO ECOLOGY,
FOOD QUALITY SAFETY**

o4–01 – Milan Mesić, Ivana Šestak, Aleksandra Perčin, Željka Zgorelec, Igor Bogunović	
The effect of soil acidity on winter wheat grain yield	81
o4–02 – Ö. Demirtaş, Y. Kurucu	
A research on determining the effects of different soil properties on spectral reflectance values of croplands	82
o4–03 – Y. Ataseven, E. Olhan	
Agri-environmental reforms of European Union in the period of 2014–2020 and effects on Turkey	83
o4–04 – E. Olhan, A. Demirdöğen	
Socio-economic consideration in GMO decision-making process in Turkey	84
o4–05 – S. Tsiaras	
Common forestry policy in the European Union. realistic scenario or utopia?	85
o4–06 – S. Türkmen, Y. Ataseven	
Evaluation of dairy establishments in Turkey with regard to food quality and safety in European Union process: The research of Ankara province	86
o4–07 – Hasn Tezcan Yildirim, Seçil Yurdakul Erol	
Nonwood forest products as an instrument for rural development: Perspective of forest villagers from Istanbul	87
o4–08 – M. T. Esetlili, Y. Kurucu, G. Çiçek, Ö. Demirtaş	
Remote sensing and GIS use in the management of agricultural risks related to climate change	88

Table of contents

o4–09 – Filip Mojsovski, Dame Dimitrovski Apple quality preservation with the use of intermittent drying process	89
o4–10 – D. Karatoteva, L. Malinova, K. Petrova Coefficients of heavy metal accumulation in soils from different landscapes	90
o4–11 – R. Sadikaj, D. Arapi, I. Malollari, E. Spaho, M. Shyqeriu, A. Cinije Assessment of the indicator relative oxygen-feed ratio (OFR) in a Rainbow trout (<i>Oncorhynchus Mykiss</i>) cultivation plant	91

SESSION

5

**HEALTH AND ENVIRONMENT, LEGAL FRAMEWORK – GIS
AND REMOTE SENSING CONTROL**

o5-01 – Jana Belceva Andreevska, Divna Pencic Monitoring results of municipal sustainable urban development based on globally recognized indicators (Case study Centar Municipality Skopje)	95
o5-02 – M. Güneş, S. Şahin A model approach for developing urban green network plan focused on historical and urban identity: A case study of republican period in Ankara province	96
o5-03 – S. Çabuk, M. Özyavuz, M. Güneş Green area organization approaches in urban planning: Kayseri case, Turkey	97
o5-04 – V. Mangaroska, K. Mangaroski Urban sustainability indicators and green strategies in urban planning	98
o5-05 – Derviş. Ali Özersoy, Hasan. Zeybek, Raif. Dimililer Analysis of the trees and ornamental plants used in Ataturk square and Çağlayan park in Nicosia – Cyprus	99
o5-06 – M. Özyavuz, S. Çabuk, M. Güneş Use of noise mapping techniques in urban landscape design	100
o5-07 – M. Sbarcea, E. Bratfanof, C. Cononov, M. Tudor Premises for establishing a regional mobility center for the Danube Delta Area	101
o5-08 – J. Pahsaliska-Andonovska, M. Shushlevska, C. Nikolovski Contribution of energy efficiency measures towards reduction of GHG emission	102

Table of contents

o5–09 – Dame Dimitrovski, Mihajlo Ivanov	
Energy efficiency of modern glass structures	103
o5–10 – M. Cetinel, Z. Ozcam	
Achieving energy efficiency in historical buildings	104
o5–11 – H. S. Cinar, N. Kart Aktas	
Xeriscape analysis: a case study in a residential garden in Istanbul	105
o5–12 – D. Hyseni, D. Tashevski, R. Filkoski	
Energy efficiency in complex buildings – Environmental benefits	106
o5–13 – Marija Lazareviki, Risto V. Filkoski, Zoran Markov	
Numerical investigation of the effect of using nanofluid on plate heat exchanger performances	107
o5–14 – Y. Pelovski, E. Serafimova, Jechko Iordanov	
Low – carbon practices for decentralized resource utilization and adaptation to climate changes	108
o5–15 – M. A. Şahinli, A. Özçelik	
Energy demand forecast for agriculture sector in Turkey	110
o5–16 – İlkey Dellal, F. İlknur Ünüvar	
The effect of climate change on food security of Turkey	111
o5–17 – M. Igić, P. Mitković, J. Đekić, M. Dinić-Branković, M. Mitković	
Rural areas in Serbia and climate change – Impacts and possible directions for adaptation	112
o5–18 – M. Dimoska, A. M. Lazarevska	
Feasibility of an eco-ethical simulation in a conditionally real world	113
o5–19 – K. Bačeva-Andonovska, T. Stafilov, V. Matevski	
Accumulation of some toxic elements in relation to its mobility in <i>Centaurea leucomalla</i> Bornm. Species from the vicinity of an As-Sb-Tl abandoned mine, Allchar, Kožuf Mountain	114

ORAL SESSION

6

**MANAGEMENT OF URBAN AND INDUSTRIAL WASTE
AND WASTE WATER**

o6–01 – Z. Sapuric, F. Ivanovski, D. Dimitovski, A. K. Maznevska	
Regional application on waste management in Macedonia.....	119
o6–02 – Y. Pelovski, E. Serafimova, V. Petkova	
Integrated treatment of BIO-wastes for circular economy	120

Table of contents

o6–03 – Ilirjan Malollari, Adelajda Andoni, Luljeta Pinguli, Xhaklina Cani, Redi Buzo, Jonilda Llupa, Krenaida Taraj, Lorina Liçi Experiments on biological treatment and process simulation of a food industrial waste	121
o6–04 – S. Aleksovski, G. Dembovski, G. Mladenovski, S. Volkanoski Gaphene–coated copper wires	122
o6–05 – F. Ivanovski, Z. Sapuric, V. Naumovski, D. Dimitrovski Establishing optimal glass packaging waste collection: A case study of city of Skopje	123
o6–06 – Milijana Georgievska, Ice Rikaloski, Spase Palceski, Igor Pavloski Treatment of oily emulsion	124
o6–07 – K. Miteva, S. Aleksovski, G. Bogoeva-Gaceva Fuel characterization produced by catalytic pyrolysis over Al ₂ O ₃ -SiO ₂ mixture	125
o6–08 – V. Stoyanov, V. Petkova, E. Serafimova, Y. Pelovski Environmental issues and management of construction and demolition waste in Bulgaria	126

POSTER SESSION

p1.1.

Air – Water – Soil pollution

p1.1–01 – Sh. Allajbeu, F. Qarri, P. Lazo, T. Stafilov Spatial distribution and temporal trend of As, Cd, Hg AND Pb atmospheric depositon in albanian moss samples	129
p1.1–02 – J. Ambarkov, A. Stamenkova, V. Ambarkova, M. Jankulovska, M. Kocubovski, A. Sotirovska-lvkovska, G. Todorovska Correlation between the dmft score of 6 year children and the concentration of fluoride in drinking water from the Easter region of the Republic of Macedonia	131
p1.1–03 – I. Brčeski, M. Golumbeanu, R. Almasan, S. Stojadinović, B. Stanimirović, B. Jovančićević Water and sediment examination from the Salty lake of techirghiol (Romania)	132
p1.1–04 – Pajtim Bytyqi, Hazir Çadraku, Ferdije Zhushi Etemi, Murtezan Ismaili, Osman Fetoshi The assessment of surface water quality in the Lepenc river basin using Water Quality Index (WQI) methodology	134

Table of contents

p1.1–05 – Rushan Ceka, Mile Serbinovski, Murtezan Ismaili, Kemajl Bislimi, Flamur Saliu Air Quality Monitoring in Pristina for the Year 2016	135
p1.1–06 – F. Dobroshi, K. Dobroshi, K. Zeneli, Sh. Alimi Monitoring underground waters in some villages around the mine “Trepça” and their impact on drinking water and health	136
p1.1–07 – B. N. Malinovic, T. Djuricic, D. Bjelic, D. N. Markic Combined electrocoagulation and electrooxidation processes for removal of ammonia from leachate	137
p1.1–08 – B. Pepa, A. Papparisto, E. Keci, H. Kicaj The preliminary assessment of biological status of Shushica River (Vlore) using benthic macroinvertebrates	138
p1.1–09 – N. O. Vrînceanu, D. M. Motelică, M. Preda, V. Tănase, I. Ivana Study of applying romanian bentonites for immobilization of heavy metals in a contaminated soil	139

POSTER SESSION

p1.3.

**Sustainable development, Renewable energy resources
and Management of natural resources**

p1.3–01 – V. Dzinlev, D. Dimitrovski Hubbert's theory applied on the world's and on Denmark's oil production	143
p1.3–02 – S. Gateva, G. Jovtchev, A. Stankov Do genotoxic effect of direct treatment with roundup differs from that induced by treatment with plant extract previously influenced by the herbicide?	144
p1.3–03 – G. Jovtchev, A. Stankov, I. Ravnachka, S. Gateva, D. Dimitrov, N. Nikolova, H. Angelov Extent of UV-induced DNA damage in angiosperms plant species at different altitudes	145
p1.3–04 – S. Ozimec, D. Prlić Habitat mapping as a tool for the improvement of nature protection in Eastern Croatia	146
p1.3–05 – V. Petkova, V. Stoyanov, B. Kostova, Aleksander Kalinkin, Irina Zvereva, Ek. Serafimova, Y. Tzvetanova, Y. Pelovski Sulphate phases in the structure of cement-based mortars with marble waste fillers	147
p1.3–06 – Q. Ramshaj, K. Kurteshi Algological analysis of river Semetisht (Peqan, Therandë) during summer season 2015	149

Table of contents

p1.3–07 – I. Selim, T. Kandikjan, A. M. Lazarevska, D. Mladenovska Adaptation of the Industrial Design thinking process to the demands of biodegradable plastics	150
p1.3–08 – E. Serafimova, Jechko Iordanov, Ruslan Yanev Thermochemical studies on different fuels and BIO-wastes	151
p1.3–09 – I. Shesho, Z. Markov, D. Tashevski, D. Dimitrovski Stry sector utilizing low temperature waste heat recovery	152
p1.3–10 – V. Stoyanov, E. Serafimova, V. Petkova, Y. Pelovski Investigation of waste from the processing of limestone from vratsa area	153
p1.3–11 – Dragan Troter, Zoran Todorović, Biljana Đorđević, Dušica Đokić-Stojanović, Ljiljana Stanojević, Vlada Veljković Influence of different amide-based deep eutectic solvents in CaO-catalyzed ethanolysis of expired sunflower oil	155
p1.3–12 – V. Vucic Building up Environmental policy integration (EPI) framework	156
p1.3–13 – Stefan Cirstea, Razvan Nistor, Andreea Cirstea, Adriana Tiron-Tudor Renewable energy and economic development “distances” in Eastern Europe	157
p1.3–14 – M. M. Coroş, A. I. Popa Study regarding the potential of wine businesses and tourism to contribute to sustainable development in Alba county	157

POSTER SESSION

p1.4.

Agriculture, Forestry, Agroecology, Food quality safety

p1.4–01 – V. Angelova The effect of organic amendments on uptake on heavy metals in miscanthus (<i>Miscanthus × Giganteus</i>)	163
p1.4–02 – E. D. Bobric, I. G. Breaban, E. Rusu, A .Enea Assessment of carbon stock in the soil of the neamţu watershead	164
p1.4–03 – A. K. Kokkinakis, K. Sofronidis Timeless fishery composition and production of Kavala’s coastal wetlands (Vasova, Eratino, Agiasma & Keramoti – Northern Greece), Aiming to their sustainable management	165

Table of contents

p1.4-04 – M. Pop	The impact of the european funds for agriculture at the level of the romanian economy	166
p1.4-05 – M. Preda, V. Tănase, N. Vrînceanu	Occurrence of pesticides in agricultural fields and orchards	167
p1.4-06 – Festim Rexhepi, Valdet Gjinovci, Kujtim Uka	Kosovo strategy for detecting the certain substances residues in live animals and animal products	168
p1.4-07 – M. A. Şahinli, A. Özçelik	The Effects of Agricultural Irrigations: The Case of Turkey	169
p1.4-08 – S. Tsiaras, Z. Andreopoulou	Multicriteria analysis on forest policy in the European Union	170
p1.4-09 – C. Constantin, A. Dobrin	Conventional and organic production on quality of chichen meat	171
p1.4-10 – Boja Nicusor, Boja Florin, Teuşdea Alin, Petru Aurel Dărău, Borz Stelian	Environmental impact assessment for use in seedbed processing a vibro-combinators soil tillage	172

POSTER SESSION

p2.2

Risk assessment

p2.2-01 – L. Milosevic, E. Mihajlovic, M. Medenica	Assessment of fire and explosion effects due to terrorist attacks on freight trains transporting liquefied petroleum gas	177
p2.2-02 – V. Petkova, Iv. Paskaleva, V. Stoyanov, B. Kostova, Vi. Kostov, R. Berberova, T. Papaliangas, Y. Pelovski	Probabilistic seismic hazard assessment in the Blagoevgrad – Bansko – G. Delchev in the Southwest Bulgaria	178

POSTER SESSION

p2.5

**Management of urban and industrial waste
and waste water**

p2.5-01 – Dame Dimitrovski, Toni Mitkovski, Filip Ivanovski, Zoran Sapuric	Projects from recycling glass waste - energy analysis	183
p2.5-02 – S. Aleksovski, S. Volkanoski, G. Mladenovski	Chemical vapor deposition of graphene on copper substrate	184

Table of contents

p2.5–03 – B. Baruti, I. Malollari, M. Sadiku, M. Kelmendi, B. Haliti-Baruti Characteristics of land pollution with heavy metals in Mitrovica and environmental and socio-economic effects	185
p2.5–04 – K. Miteva, S. Aleksovski, G. Bogoeva-Gaceva Evaluation of kinetic parameters of catalytic degradation	186
p2.5–05 – T. Stafilov, V. Stefov, V. Jovanovski, A. Čahil Treatment of waste water in leather industry	187
p2.5–06 – T. Veselaj, R. Morina, A. Berisha, F. Sallaku Assessment of heavy metals in soil impact of solid waste leachates landfills	188

POSTER SESSION

p2.6

Climate change – biodiversity – Energy efficiency

p2.6–01 – Aleksandar Andjelkovic, Vojislav Djekovic, Milorad Janic, Velibor Spalević, Gordana Djukanovic, Vesna Nikolic Floods on the river Belica at Jagodina, Serbia in 2014	191
p2.6–02 – Elena Bisinicu, George Emanuel Harcota, Aurelia Totoiu, Magda-loana Nenciu, Florin Timofte, Gheorge Radu Mesozooplankton in the romanian Black Sea area – Food source for short-lived fish species	192
p2.6–03 – Risto V. Filkoski, Zlatko Gjurchinovski Emission reduction by efficiency improvement of kilns in mineral processing industry	193
p2.6–04 – George-Emanuel Harcota, Florin Timofte, Elena Bisinicu, Aurelia Totoiu, Magda loana Nenciu, Gheorghe Radu Influence of gelatinous zooplankton on the distribution of Juvenile sprat (<i>Sprattus sprattus</i> Linnaeus, 1758) in the northern part of the romanian Black Sea coast	194
p2.6–05 – Lidija Joleska Bureska Influence of the mills maintenance on their capacity and capacity of the boiler	195
p2.6–06 – A. K. Kokkinakis, D. N. Kiourtidou Evaluating the inland waters of Thessaly Region (Central Greece), according their fish fauna and the international legislation that protects it	196
p2.6–07 – Marigona Krasniqi, Risto V. Filkoski, Drenusha Krasniqi, Done Tashevski, Driton Hiseni	

Table of contents

Options for efficiency enhancement and NOx emission reduction of utility coal-fired steam generator	197
p2.6–08 – Magda-Ioana Nenciu, Gheorghe Sirbu, Aurelia Totoiu, Gheorghe Radu	
Forecast and sensitivity analysis for the recruitment/spawning stock biomass relationship in Black sea sprat (<i>Sprattus sprattus</i> Linnaeus, 1758)	197
p2.6–09 – Aurelia Totoiu, Gheorghe Radu, Magda-Ioana Nenciu, Neculai Patriche	
Overview of the health status of the main romanian Black sea coast fish	201
p2.6–10 – Aurelia Țoțoiu, Gheorghe Radu, Cristian Danilov, Magda-Ioana Nenciu	
Quantitative and qualitative analysis of juvenile fish populations of the romanian Black Sea coast during 2016–2017	203
p2.6–11 – Ferdije Zhushi-Etemi, Nesade Muja, Pajtim Bytyqi	
Contribution to the knowledge of dragonfly fauna of the Sitnica River in Kosovo (Insecta: <i>Odonata</i>)	205

POSTER SECTION

p2.78

Green Smart Cities / Societies – Green Archiceture, Landcape Design and transport Healt and Environment

p2.78–01 – M. Krstanoski, A. M. Lazarevska, D. Mladenovska, K. Jakimovska	
Sustainability, accessibility and energy efficiency aspects of conveying systems.....	209
p2.78–02 – D. Popa, S. Varvara, M. Moldovan, D. Prodan, A Varsta, M. Popa	
Study on the importance of physico-chemical characteristics from the wals in the rehabilitation works of heritage buildings	209
p2.78–03 – D. Bakova, R. Massaldjieva, A. Janeva, K. Kilova, S. Dragusheva	
Health nutrition in the bulgarian community – contemporary approaches	212
p2.78–04 – Michaela Beltcheva, Roumiana Metcheva, Nikolay Popov, Margarita Topashka-Ancheva, Svetla E. Teodorova, Tsvetelina Gerasimova, J. Antonio Heredia-Rojas, Abraham O. Rodríguez-de la Fuente, Laura E. Rodríguez-Flores	

Table of contents

Kinetic models for the lead bioaccumulation and mitotic index in lead-poisoned and zeolite-treated laboratory mice	209
p2.78-05 – Cristian Sorin Danilov, Andra Oros, Aurelia Totoiu, George Tiganov, Magda-Ioana Nenciu, Victor Cristea Heavy metal contamination of <i>rapana venosa</i> (Valenciennes, 1846) at the romanian Black Sea coast	214
p2.78-06 – L. Gjyli, J. Kolutari Marine litter assessment in costal waters of Durres bay (Albania)	215
p2.78-07 – J. Antonio Heredia-Rojas, Michaela Beltcheva, Roumiana Metcheva, Ricardo Gomez-Flores, Abraham O. Rodríguez de la Fuente, Omar Heredia-Rodríguez, Laura E. Rodríguez-Flores, Esperanza Castañeda-Garza Evidence of genotoxicity in mice exposed to extremely low frequency electromagnetic fields compared with ionizing radiation and a chemical mutagen	217
p2.78-08 – Serkan İlseven, Mert Bastas Negativities of quarries on the Kyrenia Mountains towards natural environment and human health	218
p2.78-09 – E. Serafimova, Y. Pelovski, V. Petkova Evaluation of BTEX exposure in indoor air with intera in southeast Bulgaria	219
p2.78-10 – S. Stojanovski, D. Blazhekovikj-Dimovska, N. Hristovski, S. Smiljkov, L. Velkova-Jordanovska Helminth fauna of Prespa Bleak (<i>Alburnus alburnus belvica</i> Karaman, 1924) (Pisces: Cyprinidae) from Macedonian part of Lake Prespa	220
p2.78-11 – B. Trajanoska, E. Doncheva Influences of structural glass on working environment quality and healthcare benefits	221
p2.78-12 – Nena Velinov, Slobodan Najdanović, Miljana Radović, Jelena Mitrović, Miloš Kostić, Danijela Bojić, Aleksandar Bojić Optimization of parameters for loperamide biosorption onto lignocellulosic-Al ₂ O ₃ hybrid	222
p2.78-13 – D. E. Panait, A. C. Jufa, L. Floroian, O. B. Oprea, A. M. Pascu, M. Badea, M. Popa, E.-V. Macocian, S. Bungau Environmental electromagnetic pollution due to radiation leakage from microwave ovens	223
INDEX of AUTHORS	225

INVITED LECTURES AND KEY SPEAKERS



MODELS AND SCENARIOS FOR ENERGY AND EMISSIONS PLANNING

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Abstract: Many European countries are facing similar energy issues: a scarce domestic production and a reliance on foreign supply. For all these European nations, CO₂ and other noxious gases emissions are under strict control in order to reach the self-imposed environmental targets, sometimes in compliance with EU directives. The present situation of the Italian energy sector – for instance – highlights also a certain dependency from hydropower generation: this represents a vulnerability in the long term, as water flows are generally not constant and the effect of climate changes might impact on the predictability of such a technology. Many eastern European electricity networks are also affected by high loss rates (reaching peaks of 30%). Starting from the analysis of the present situation, the study provides also some results of forecast exercises, in view of a diversification of fuels, which is becoming increasingly necessary. The exercises are performed making use of a model developed within the EU which allows to evaluate the optimal energy supply mix under the cost point of view, including emissions, taking into account all the technological and economical details of the energy solutions, infrastructures and processes involved. The model also foresees the possibility to take into account for the geopolitical risk posed by some countries. The comparative analyses show how two countries, although with very different parameters, show similar possible solutions for the energy and emissions question.

Key words: models, scenario, energy issues, emissions, planning

OVERVIEW OF SKOPJE AIR POLLUTION – RARE CASE

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Abstract: Skopje is located in the north of the Republic of Macedonia, in the center of the Balkan Peninsula. The city is built in the Skopje valley, oriented on a west-east axis, along the course of the Vardar river. Pollution of the air with PM10 reach nearly 1000 ppm which is 20 time more than normal for urban areas and about 200 days/year it is above the limits. Skopje is in a nutshell. This paper gives an overview of the air-pollution in the Skopje valley. It also covers the measurement of air quality, monitoring network and results from multiple sources. The paper analyses the state of the transport, industry, households and other mayor polluters in the city, and the contribution from each.

Key words: air pollution, air quality, urban air

HEAVY METALS POLLUTION STUDIES IN DIFFERENT ENVIRONMENTAL MEDIA IN THE REPUBLIC OF MACEDONIA

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Abstract: Anthropogenic environmental changes, associated mainly with chemical pollution, lead to a degradation of the natural human environment. Among all chemical pollutants, trace elements are of a special ecological, biological and health significance. The production of energy and the consumption of natural resources are the main source of trace elements as contaminants. However, agricultural activities, especially the application of fertilisers and pesticides, also contribute significantly to trace metal pollution in the environment. Soil, as a part of the ecosystem, is vital for the survival of mankind which is closely connected to its productivity. Therefore, the surveys of the pollution with heavy metals of soil, waters, sediments, air and food on the whole territory of the Republic of Macedonia were performed. For that purpose various instrumental techniques such as atomic absorption spectrometry (AAS), inductively coupled plasma – atomic emission spectrometry (ICP-AES), inductively coupled plasma – mass spectrometry (ICP-MS) and neutron activation analysis (NAA) were applied. Air pollution was investigated by the application of moss biomonitors and dust samples (attic dust and household dust). The pollution with heavy metals in the particular regions was additionally investigated. It was found that the highest pollution is present in the areas with abounded or active mines (Pb, Zn, Cu, As, Sb, Ni, Cr), metallurgical plants (Pb, Zn, Cd, Fe-Ni, Fe-Cr, Fe-Si, Fe, steel) or thermo-electric power plants. High content of some heavy metals were also found in the areas where their contents usually vary gradually across the geochemical landscape and depend on the geochemistry of the underlying lithology. The distributions of such elements reflect natural processes indicated by the elements that are either rarely or never involved in the industrial processes. The obtained data are statistically processed and spatial distribution maps for each specific element are prepared to give a proper interpretation of the obtained results.

Key words: heavy metals; pollution; air; soil; water; sediments; Republic of Macedonia

SAFETY AND SECURITY OF WATER QUALITY AND RESOURCES

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Abstract: Chemicals are integral matters of all components of environmental media, from air, soil and rocks and also they are the necessities for human survival/sustainability of life and development. Despite being vital for human life and sustainability of development, chemicals do carry inherent risks for human life and environmental quality, require special safety management practices to minimize their risks to the workers, users and environmental media.

Availability and quality of water, on the other hand, are also “vital”, not only for human beings, but for all living organisms and plants to sustain life. Assuring availability/access of water at needed quantities has been the primary goal of communities throughout the history. Following birth of the industrial revolution, water has also become an energy input that sparked its excessive use. Recent major changes in the climate patterns, increasing regional population trends, degradation in environmental soil and water quality in undeveloped/developing nations have become major roadblocks in achievement of global sustainable development efforts.

Safety is a term defining the measures to take precautions and measures to protect subjects from the negative effects of potentially harmful events, while Security covers the physical measures to assure application of safety measures from misconduct or willful intervention of others.

Despite its abundance on earth, water has also become a precious natural resource and a commodity for its lack of availability and quality for communities at global level, making “supply security” and “quality safety” a matter of a major management concern for public authorities.

Security risk assessments for chemicals and water are based on the similar logic used for general risk evaluations incorporating intentional intervention (*theft or sabotage*) of outsiders. Security also incorporates the means and ways of commodity distribution throughout the supply-chain. Therefore, on a macro scale, implementation of security measures require Private/Public Partnership in order to minimize potential deprivation/harm

of public as water/chemicals are delivered and stored until they reach the intended end-users.

In this presentation, distinction between Safety and Security concepts in chemicals management will be reviewed along with a discussion of applicability of these concepts in water management, in terms of “quality-safety” and “supply security”.

Key words: Safety, Security, Chemicals Management, Water Safety, Water Security

IMPLEMENTATION OF THE NEW METHODS FOR THE IMPROVING MARITIME POLICY IN THE ROMANIAN COSTAL AREA

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Abstract: Integrated Coastal Zone Management (ICZM) and Maritime Spatial Planning (MSP) are modern concepts based on the principle of sustainable development and protection of the coastal areas taking into account the economic and social development of the sea, in order to increase the coastal and maritime economic potential in an integrated way avoiding conflicts and creating the maximum of understanding and synergy between different target stakeholder's groups. Coastal pressures include: accelerating the decline of habitats and natural resources, including beaches, wetlands as well as fisheries and other marine and coastal resources, increased vulnerability to pollution, beach loss, habitat loss, natural hazards and the long-term impact of climate changes. Future developments and more aggressive competition for land and marine resources will lead to conflicts and destruction of the functional integrity of the coastal system. The present work focuses on the on following researches:

- ✓ Developing an information system and a database as decision support for the Romanian coastal zone, in order to transfer to the stakeholders, the scientific results and the feedback;
- ✓ Participatory modeling techniques used to ensure the maximum potential for local, national and regional target groups to adopt;
- ✓ Interactive exchanges with stakeholders for the analysis and mitigation of maritime spatial conflicts and the impact of large-scale interactions by introducing good practices;
- ✓ Overlapping spatial distribution of different characteristics (pressures and threats, bio-geo-physical characteristics, sensitive habitats, etc.);

- ✓ Spatial analysis to identify interactions (synergies and conflicts) arising from the use of marine and coastal zone, the cumulative impacts of coastal activities on coastal and maritime ecosystems, maps of spatial interactions between human activities, with visualization of real conflicts and synergies.

The need to implement integrated maritime policy and programs is due to pressures on marine and coastal natural resources, caused by increased population numbers, marine pollution from land-based sources and human intervention on river basins, harmfully affecting coastal processes.

Key words: Integrated Coastal Zone Management (ICZM), Maritime Spatial Planning (MSP), coastal pressure, target groups involvement, maritime policy.

HOUSEHOLD HEATING ON SOLID FUELS AS A SOURCE FOR URBAN AIR POLLUTION IN SKOPJE

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Abstract: In this article general information about the air quality in the Skopje valley are provided, such as: its geographical, climatic and meteorological conditions. The automatic measuring stations of the city of Skopje show that PM10 concentrations in all measuring point in the city of Skopje is drastically above the limit of $50\mu\text{g}/\text{m}^3$, with accident reaching value up to $1000\mu\text{g}/\text{m}^3$. The analyses provided show the main contributors to the pollution with PM10 and the reasons for emission and reemission of the particle matters. Part of this research is done by conducting a survey on 5044 households in 17 municipalities of the Skopje plan region, with analysis of the type of system they use for heating the household, the surface area of the object they live, in the part of the object they heat during the winter (heating season), the fuel they use or source of energy for heating, and the amount of fuel for one heating season. The analytical comparison of meteorological conditions and the curve of Heating degree days point to heating on solid fuels as one of the most intensive emitter of PM10 and PM2,5 particles, especially during the heating season.

*Part of this research was developed in the frame of Macedonia's Second Biennial Update Report, UNDP Office in Skopje.

Key words: solid fuels, urban air pollution, Skopje

ORAL SESSION

1

**AIR – WATER – SOIL POLLUTION,
SUSTAINABLE DEVELOPMENT**



o1-01 – Key speaker

AIR POLLUTION BY HEAVY METALS IN SKOPJE

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Abstract. The objective of the study was to assess the level of heavy metals in atmospheric samples of precipitation in Skopje, Republic of Macedonia. The aim was to assess potential health adverse effects to inhabitants living nearby the Iron Smelter Plant. In the period 2006-2016 have been analyzed lead, cadmium, iron and manganese from atmospheric samples of precipitation in the territory of Skopje on 4 measuring sites in the laboratories of the Institute of Public Health of the Republic of Macedonia. On the measuring site settlement Gorno Lisice (residential zone) have been registered the lowest concentrations of heavy metals, as well low levels have been measured on the measuring site settlement Gjorce Petrov (residential zone). Both measuring sites are far away from the Iron Smelter Plant. Highest concentrations of heavy metals have been registered on the measuring sites Headquarter of the Iron Smelter Plant and on the settlement Zelezara (industrial zone) – nearby to emission source. Since 2014, the level of heavy metals in atmospheric samples of precipitation have been significantly reduced by introducing dust removal filters in order to reduce air emission from waste gaseous from the Iron Smelter Plant. Public health risk to local population has been lowered related to impact of heavy metals from the Iron Smelter Plant.

Key words: air pollution, heavy metals,
atmospheric samples of precipitation

o1–02 – Key speaker

MODELLING THE SPATIAL VARIABILITY OF URBAN AIR QUALITY AFFECTED BY ROAD TRAFFIC

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Abstract: Air pollution continues to be a major problem in cities of Romania, even though industrial activities shows a decreasing trend. Mobile emissions are the major source of urban air pollution and have been associated with a variety of adverse health outcomes. At the end of 2017, in Romania three municipalities are in the infringement procedure. The only one that remains and is about to be sent to the European Commission of Justice is the city of Iasi because of the measures that officials failed to implement for air quality improvement. Bucharest will shortly complete the approval procedures for the air quality measures plan, while in Braşov it is already being implemented. The present study examines the spatial and temporal variability of air pollution in a very important and frequently circulated intersection, Podu de Piatra. The studied area is cross of a large number of diesel- powered vehicles emitting fine particulate matter and nitrogen oxides (NO_x), the spatial variability of traffic-related air pollutants in the area being rarely investigated. A spatial exposure assessment model combining proximity and dispersion models was used to estimate the overall impact of transport on air pollution. The input data used in the modeling were: direct measurements, field observations, meteorological data, data from atmospheric pollution monitoring stations, the relationship between traffic intensity, pollutant concentration and exposure of the vulnerable population being analyzed. The integration of all variables and the spatial distribution of the obtained results was performed by GIS techniques. The main outcomes are: air circulation contributes to increasing the relative concentration of pollutants on different parts of the streets; monitoring stations have difficulty in accurately estimating the variation in wind speed; weather conditions, especially wind direction, contributing considerably to the NO_x emissions dynamics; assessing the representativeness of data from the national air quality system.

Key words: modelling, air quality, spatial variability, road traffic

SOURCES OF URBAN AIR POLLUTION IN MACEDONIA – BEHIND HIGH POLLUTION EPISODES

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Abstract: High air pollution episodes during the winter season throughout urban areas in Macedonia become primary public health concern and topic for wide public discussion. However, although this topic is marked as one of most important pollution topics, volume of scientific data published on air pollution sources and pollution profiles is quite low, especially having in mind dynamic changes in source profiles and pollution patterns over the last years. Few recent studies indicate domestic heating, traffic and industry as dominant sources (listed in order of importance), but no clear conclusion about dominant sources of high pollution episodes is drawn. Lack of this data clearly limit possibilities for proper response and development of efficient control/reduction measures during such episodes. The paper summarize latest publicly available data, as much as the finding from the studies and combine them in order to point dominant sources and pollution patterns during the high pollution episodes. This work also include pollution patterns collected from AMBICON.UGD monitoring network in several urban areas in Central and Eastern Macedonia, as much as chemical profiles of ambient particulates, all in attempt to fill the data gaps and indicate dominant pollution sources.

Key words: air pollution, particulate matters, high pollution episodes, pollution patterns, chemical profiles.

o1-04 – oral

CARBON MONOXIDE AND NITROGEN OXIDES EMISSIONS FROM BOILERS WITH THERMAL POWER LOWER THAN 3 MW

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Abstract. The various types of fuels (liquid, solid and gaseous) are available for firing in small combustion plants (boilers, stoves and other equipment for combustion). The selection of fuel type depends on various factors. In the Republic of Macedonia, wood is the most commonly used source of energy for heating dwellings, while gas and liquid fuel are most frequently used in industry. Macedonian legislation for stationary sources of emission into the air, especially for small boilers, doesn't control the emission of gases and dust as it is regulated in Croatia, Serbia and Slovenia. Nitrogen oxides (NO_x) and carbon monoxide (CO) emissions are common measuring parameters for small combustion plants regulated in the above mentioned countries. With this objective, Farmahem Environmental Laboratory made analyses of NO_x and CO from 86 emission measurements during the period 2007–2018. The measurements were performed with the gas analyzers Testo 350XL/454 and Horiba PG 350E. The results of the emissions from these pollutants, compared with the limit values given in the legislation of these three countries, demonstrate that the establishment of the national legislation for small combustion plants is a crucial tool for improvement of the air quality in R. Macedonia.

Key words: stationary source of emission, small combustion plant, nitrogen oxides, carbon monoxide, legislation.

LONGTIME GEOCHEMICAL EVALUATION OF ANTHROPOGENIC ELEMENT'S DISTRIBUTION IN THE AIR USING DEPOSITED ATTIC DUST

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Abstract: Atmospheric deposition poses significant ecological concerns. In this work attic dust was examined as historical archive of anthropogenic emissions, with the aim of elucidating the pathways of enrichments associated with exploitation of Cu, Pb and Zn minerals in the Bregalnica river basin region. Attic dust samples were collected from 84 settlements. At each location for attic dust sampling, topsoil samples from the house yards were also collected. Mass spectrometry with inductively coupled plasma (ICP-MS) was applied as analytical technique for determination of Ag, Bi, Cd, Cu, In, Mn, Pb, Sb, Te, W and Zn. The Universal Kriging method with linear variogram interpolation was applied for the construction of spatial distribution maps. This geochemical association links typical elements which are normally associated with air pollution (Cd-Pb-Zn), and usually are not influenced by lithological background. This investigation fortifies an extended anthropogenic association (Ag, Bi, In and Mn) that implement some other anthropogenic activities such as agricultural activities (use of urban sludge, manure and fertilizers) or their occurrence can be a secondary affection from mine poly-metallic pollution. Spatial patterns showed intensive deposition in the areas of Pb-Zn mining activities ("Sasa" and "Zletovo" mines) and copper mine "Bučim". Long-distance distributions of higher contents of these elements from the mines were not detected.

Key words: attic dust, metals, ICP-MS, spatial distribution, air pollution

NOISE POLLUTION – AGGLOMERATIONS VS SMALL URBAN AREAS

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Abstract: In last few decades noise pollution has a growing impact on life quality, as a result of inadequate, unplanned urbanization, traffic intensification, usage of obsolete motor vehicles, etc. A number of surveys and monitoring studies in recent decades have shown that noise pollution, as a part of air pollution, presents a real threat to people's health and life quality. Considering this, a two-year monitoring of noise level in three urban areas, City of Skopje and Tetovo (as agglomeration) and Stip (as smaller urban area) have been performed. Municipality of Stip was chosen as a representative of a small urban area with dynamic development, whose noise dispersion model (NDM) can be applied to all other similar urban areas. Based on performed measurements, noise dispersion model for those three urban areas using SoundPLAN Software were developed. The aim of this paper is to point out the fact that small urban areas, such as Stip, have also a problem with high noise levels. On the other hand, they have no legal obligation to develop strategic noise maps and action plans for solving noise pollution problems, or to assess health effects related to high noise levels and apply noise reduction measures. The paper try to answer the questions; are the small urban areas are safe from noise pollution and should they also develop noise reduction action plans?

Key words: noise pollution, urban areas, noise dispersion model, human health

ECOLOGICAL STATUS ASSESSMENT VS. SPECIFIC POLLUTANT LOAD: IS ICT THE MISSING LINK?

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Abstract: With the development of society, the problem of treatment of generated wastewater is getting increasingly bigger. Polluting substances from wastewaters directly affect the quality of surface and indirectly the quality of groundwater. Disturbances of aquatic ecosystems caused by the discharge of untreated wastewater have gradually increased to such a degree that the purification was imposed as a necessity. In this sense, the paper is organized as follows. First part of the paper is dedicated to the issues of ecological status parameters monitoring, evaluation and assessment. The advantages and constrains of this methodology are showed at the example of relatively large surface water body – the Danube river, class I surface water body and relatively small water body – the Nišava river, class III surface water body. While the ecological status assessment represents some kind of “diagnosis measure” the specific pollutant load represents initial water protection measure, which is further elaborated within the second part of the paper. Additionally, the third part of the paper presents an in-depth analysis of ICT application potential within various water protection segments, with particular regard to the field of specific pollutant load management, as most prominent one in almost every modern society.

Key words: ICT, water quality management, ecological status, specific pollutant load, sustainability.

COMPARATIVE ANALYSIS OF SELECTED ENVIRONMENTAL INDICATORS WITHIN ADJUSTED SAVINGS IN SERBIA AND MACEDONIA

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Abstract: Environmental indicators allow monitoring of environmental changes both locally and globally. Changes in environmental indicator values suggest a specific status of phenomena or processes over a specified period. The possibility of comparing data via environmental indicators provides a clearer picture. This paper presents a comparative analysis of selected environmental indicators within adjusted savings in Serbia and Macedonia between 2008 and 2012. The indicators on which the comparative analysis is based are the following adjusted savings: particulate emission damage, carbon dioxide damage, and energy depletion. Considering that national environmental indicator methodologies of Serbia and Macedonia are equivalent to the EEA methodology and within the DPSIR framework, the paper utilizes applicable national methodologies. In addition, the adjusted savings environmental indicators according to the World Bank are used. The most significant results obtained from the comparative analysis are presented in the paper. The final section deals with the status of the selected indicators over the analysed period, as well as with the possibility of influencing specific environmental phenomena and processes in order to improve the values of certain indicators in the future.

Key words: comparative analysis, environmental indicators within adjusted savings, Serbia, Macedonia

CONTRIBUTION OF CO₂, NO AND PM_{2.5} PARTICLES EMISSION TO GLOBAL ATMOSPHERIC POLLUTION: A COMPARATIVE ANALYSIS OF EU AND WESTERN BALKAN COUNTRIES

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Abstract: The emission of pollutants into the air significantly affects the global processes and effects of the atmosphere, as well as the quality of the environment. Global climate changes are conditioned by the emission of greenhouse gases. With the aim of minimizing these impacts according to the Kyoto Protocol, as well as the Paris Climate Agreement, state parties oblige to limit the emission of greenhouse gases into the atmosphere. The present paper provides analysis of the contribution of CO₂, NO and PM_{2.5} particles emission, in the function of global air pollution in several developed EU countries (Germany, Austria and France) and in Western Balkan countries (Serbia, Macedonia and Albania). The paper includes an in-debt analysis of the selected environmental indicators from the thematic area of air and climate change, according to the environmental indicators of the World Bank, EEA methodology and the applicable national methodology. National pollutant emissions were analyzed in relation to the GDP and the total population. Based on a comparative analysis, the general conclusion is that in the observed countries there are differences in the relative greenhouse gas emissions, expressed in relation to the GDP and the total population.

Key words: comparative analysis, emission of CO₂, NO and PM_{2.5}, environmental indicators

DISTRIBUTION AND ORIGIN OF SOME RADIONUCLIDES INTO CORN (AS ANIMAL NUTRITION) AND SOIL SAMPLES, FROM DIFFERENT LOCATIONS IN THE SKOPJE VALLEY

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Abstract. Concentration of natural radionuclides in soil and plants are crucial parameters used to define the level of contamination of the environment and radiation risks for the human population. From the 14 localities of the surrounding of Skopje, cultivated and uncultivated soil samples were taken to determine with gamma spectrometry the specific activity of ²³²Th, ²²⁶Ra and ⁴⁰K. The analysis data show that the mean value of ²³²Th specific activity in cultivated soil was 43.74±4.99 Bq·kg⁻¹, while in uncultivated soil it was 35.70±5.65 Bq·kg⁻¹. The ²²⁶Ra specific activity had a mean value of 34.09±6.53 Bq·kg⁻¹ and 28.30±5.54 Bq·kg⁻¹, in cultivated and uncultivated soil, respectively. The specific activity of ⁴⁰K from all localities was higher than the one of ²³²Th and ²²⁶Ra, and in cultivated soil it was 608.12±70.43 Bq·kg⁻¹, while in uncultivated soil it was 506.54±59.96 Bq·kg⁻¹. Additionally, the significance of obtained data was confirmed by the statistical test, at p<0.05. Also from the same locations corn samples were taken for analysis. Concentration of natural radionuclide in corn are lower than referent values. From the results and Transfer factor-TF of natural radionuclides from soil to corn was calculated.

Key words: soil, corn, natural radionuclides, gamma spectrometry, radiological risks

EVALUATION OF AN FIXED-BED ADSORPTION COLUMN FOR REMOVAL OF LEAD, CADMIUM AND ZINC USING DIFFERENT BIOSORBENTS

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Abstract: Pollution of water by heavy metals through the discharge of industrial waste water is a worldwide environmental problem. Availability of clean water for different activities is becoming the most challenging assignment for researchers worldwide. Different methods for water pollution control are being used, however, adsorption has been found to be superior to other techniques in flexibility and simplicity of design, inexpensiveness, ease of operation and insensitivity to toxic pollutants. The present article describes the adsorption of cadmium, lead and zinc ions using waste products and natural low cost products (olive waste, maize cobs, bentonitic clay, wheat bran, coal ash and coffee waste) in a fixed-bed adsorption column. A solution of known concentration of cadmium, lead and zinc were allowed to pass through an adsorption column that contained 1g and 3 g of biosorbents. The amounts of cadmium, lead and zinc ions were measured using Flame Atomic Absorption Spectroscopy in terms of their residual concentration in three 20 cm³ fractions (FI, FII, FIII), at the outlet stream. The result showed that the increase of the adsorbents amount from 1g to 3g increases the percentage of metal ions removal; also increasing of contact time (third fraction FIII, which is longer in column) increases the percentage of metal ions removal.

Key words: olive waste; maize cobs; wheat bran; coal ash; coffee waste;

ORAL SESSION

2

**SUSTAINABLE DEVELOPMENT,
RENEWABLE ENERGY RESOURCES
AND MANAGEMENT OF NATURAL
RESOURCES**



o2-01 – Key speaker

HOLISTIC AND INTEGRATED APPROACHES TO SUSTAINABLE OPERATIONS AND SUPPLY CHAIN MANAGEMENT

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Abstract: A growing number of organizations are integrating economic, ecologic and financial sustainability considerations into their management processes, driven by increased societal and stakeholder pressures. With a view to support organizations in this global challenge, this paper presents the emerging research avenue of integrating decision-making tools for holistic development of economic, ecologic and social sustainability in operations and supply chain management (O&SCM). Stakeholders external (customers, legislative bodies, public) and internal (employees, shareholders) to organizations are demanding higher performance levels from organizations, not only economically, but also environmentally and socially. Delivering the current needs of the society while conserving the same ability of future generations lies at the heart of sustainability management. This includes management of organizational products, processes and services across their supply chains and life cycles against the multi-dimensional criteria of triple bottom line (TBL). This paper provides current trends in sustainable O&SCM together with some useful application of integrated decision making tools such as sustainable value stream mapping and simulation based sustainable impact analysis. The proposed integrated decision making tools will enable O&SCM practitioners to integrate sustainability factors focusing on product, process and system levels.

Key words: Sustainable Operations and Supply Chain Management, Lean and green, Sustainable Value Stream mapping, Simulation, Sustainability Performance Assessment

o2-02 – key speaker

VARIATION OF GRID-CONNECTED PHOTOVOLTAIC SYSTEMS ELECTRICITY GENERATION IN THE BALKANS REGION

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Abstract: In this paper, analyses of monthly variations of daily data solar radiation series have been performed. For this, using the WRDC solar radiation database for daily solar radiation on a horizontal plane, for 44 meteorological stations from 8 countries across the Balkan Peninsula, is examined and probabilistic analyses is carried out. In order to avoid seasonal trends, the clearness index is used as a parameter in probability density distributions. Gaussian probability density functions are used for fitting the probability density distributions. Furthermore, a dependence of the standard deviation to the mean value of the daily clearness index is proposed. These findings, are used for calculation of annual monthly sets of mean values of the daily clearness index that occur with a specified probability. These values are then used for calculation of series of the monthly mean values for solar radiation on a horizontal plane, and then for generation of hourly solar radiation data series, with appertained probability. The solar radiation data series that occur with a specified probability are then used for performance simulation of a grid-connected photovoltaic system. The elaborated theory is applied for obtaining the occurrence probabilities of the total monthly electricity supplied to the network and of the monthly financial gain. It is concluded that the electricity generation in absolute values with a specified occurrence probability tends to be constant over the months.

Key words: Solar radiation, occurrence probability, photovoltaic systems, generation of hourly solar radiation data.

SUSTAINABILITY ASPECTS OF ADDITIVE MANUFACTURING

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Abstract: Improvement of the sustainability of products seems like constant battle between the production companies and the society, in order to preserve the environment for the future generations. New opportunities are on the horizon with the additive manufacturing technologies. Additive manufacturing, known as 3D printing, encompass different processes under one name. Each of these processes is unique, but they are all based on the same principle for layer-by layer building of the product. The versatility of these processes may seem challenging but on the other hand, it gives a wide range of opportunities for different application in product design and production. Companies worldwide are already using these benefits and redesigning their products. In this paper, we want to show that design can make huge impact. We can achieve that by using the topology optimization tools and the additive manufacturing in order to create lightweight parts. We use topology optimization to achieve best solution for the design of the part and the additive manufacturing to produce it.

Key words: sustainability, additive manufacturing, design process, lightweight parts.

o2–04 – oral

REVERSE ENGINEERING AND ADDITIVE TECHNOLOGIES IN CIRCULAR ECONOMY

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Abstract: The opportunity to redesign various parts for production has developed techniques that are in continuous use, including the Reverse Engineering (RE). RE encompasses a variety of approaches to reproduce a physical object with the aid of drawings, documentation, or computer model data. RE is the process of obtaining a geometric CAD model from 3-D points acquired by scanning existing parts. Recently, the acceleration of machining parts design and applying the CAD for RE has resulted in the need for their rapid production, now known as Additive Technologies (AT). Additive Technologies is defined by a range of different production processes that are capable of translating virtual solid model data into physical models in a quick and easy process. AT can be used to remove or at least simplify many of multi stage processes. With the addition of some supporting technologies it can be possible to manufacture a vast range of different parts with different characteristics and with economic reasoning. The economic aspect is always present in engineering analyzes in various forms by advancing access to all sectors of production. Circular economy is one of them and considered as an alternative to a traditional linear economy in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life. Circular economy is part of the ongoing narrative on industrial sustainability covering resource efficiency, reduced energy, and increasing the efficiency. The idea of circular economy applied in large industrial constellations where companies exchange resources and have alternative forms of access to products and services that can increase the efficiency of use of already manufactured products and thus reduce the demand for new production. In this paper we explain the improvements of Circular Economy in Reverse Engineering and Additive Technologies during they use in industrial sector, their impact and efficiency in implementation. This paper analyzes the benefits and barriers of circular economy during applying in RE and AT.

Key words: circular economy, reverse engineering, additive technology.

END-OF-LIFE ANALYSIS OF BIODEGRADABLE PLASTICS FOR INDUSTRIAL DESIGN PURPOSES

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Abstract: Today, academic community and manufacturers are making efforts to develop plastics that have short time span in order to accommodate environmental, social and economic implications. Eventually, biodegradable plastics are gaining attention among designers and companies as materials that can imitate the benefits of petrol based plastics having the capability of degradation. The selection of these materials has influence on the production facilities, consumer use and disposal methods. These requirements are challenging, but in parallel they provide opportunities for designers in the product development process as they influence the production facilities, consumer use and disposal methods. The designers should be able to solve the problem by designing products that fulfill both the needs of biodegradability and user acceptance. In order to adopt the biodegradability requirements in the design process, the implication on the different phases of the product life cycle have to be reviewed. Unfortunately, since these materials are remarkably new in the industry, there is a lack of information for these environmental friendly materials in the literature review. Thus, in the scope of this research, based on currently available sources an adapted industrial design scheme is developed to demonstrate the end-of-life cycle analysis of biodegradable plastics.

Key words: end-of-life analysis, biodegradable plastics, industrial design, user acceptance

o2-06- oral

PRODUCTION AND CONSUMPTION BASED APPROACH IN ANALYZING INTERNATIONAL ENERGY SPILLOVERS AND ITS RELATION TO DEVELOPMENT

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Abstract: The world's population growth causes increase in production and consumption of goods and services, on one side, and greater demand for land, energy and materials, on the other, leading to intensified global economic activity and global exchange of goods and services. International trade creates economic linkages among nations thus implying energy spillovers between industrialized countries or the so – called OECD and non-OECD countries. In this research paper, the production – based and the consumption – based use of energy and its correlation with economic growth is analyzed. The Multi – Regional – Input – Output (MRIO) methodology is utilized to determine the amount of direct and indirect use of energy related with products traded internationally. The analysis encompasses 49 countries and regions, 200 industrial sectors and 7 final demand categories in the period from 1995 till 2012. The main focus of the analysis sets on natural resources extraction, energy carriers use and emissions relevant to energy use. Different perspectives causing changes to both international trade patterns and global economic development are discussed. The production and consumption accounting showed a certain decline in the amounts of energy embodied in the foreign exchange of products within the developed countries. In contrast, the figures for the developing countries had an increasing tendency, but surprisingly higher shares of renewable energy use within the national energy mix.

Key words: international energy spillovers, energy carriers use, multi regional – input–output (MRIO) analysis

MODELING AND EVALUATION OF WATER DEMAND AND SUPPLY (CASE STUDY KÜÇÜK MENDERES BASIN IN TURKEY)

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Abstract: Küçük Menderes basin is located in the Aegean Region, western Turkey. Küçük Menderes basin is one of the most productive regions that provide sufficient water to produce food for everyone in this region. Küçük Menderes basin basically provides water for different sectors; industrial, agricultural demand and environmental (wildlife) demand along with municipal (settlement) demand. In the coming years, climate change is expected to pose serious challenges in Küçük Menderes basin. Shortly, it is necessary to treat the basin water in such a way that the environmental demand is least affected. Most water use takes place in agricultural production therefore water scarcity, based on climate change, will directly affect the water demand for agriculture. The aim of this research is increasing the understanding of water demand distribution to apply for different future climate change scenarios. Scenario/Model helps to comprehend what is water demand management strategy for different sectors; industrial, agricultural, municipal (settlement) and environmental demand during the lack of rainfall in the basin. In this project, according to the amount of rainfall, sector priorities determined and a model produced for water allocation during the change of years. In the first step, maximum and minimum total municipal (settlement) demand is calculated based on population and water consumption by person for a year, as it follows in the second step, maximum and minimum water demand for agriculture is computed. Environmental demand is calculated according to water demand for lakes and industrial demand is calculated by using water demand for different industries. As a result, a dynamic model is produced by calculating water demand and supply. Model manages water scarcity for different sectors and indicates water allocation during lack of water.

Key words: water demand and supply, climate change, dynamic model

o2–08 – oral

SUSTAINABLE MANAGEMENT OF RURAL- ECOLOGICAL COMMONS: RECOMMENDATIONS ON EDPSIR CAUSAL NETWORKS

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Abstract: This study aims to reveal the importance of the pastures as the rural-ecological commons in terms of biodiversity and ecological sustainability by focusing on the transformative impacts of the enclosure and commodification processes. Pastures are crucial especially within four dimensions: (i) rich biodiversity of flora and fauna; (ii) rural development; (iii) erosion prevention; and (iv) rural tradition. The conflicts on the pastures and their triggering mechanisms are the main research interests of the study. Sustainable management of the rural-ecological commons has a potential to prevent the conflicts on the pastures. Three case study districts in Izmir (Turkey) are chosen to determine the conflicts on the pastures in relation with the recent legal regulations, determination, delimitation and allocation processes, malpractices and the civil responses. The data gathered from the in-depth interviews with professionals, village headmen and media analysis, in addition with the personal observations and secondary data are evaluated by the content analysis to determine the main conflicts and the pasture dimensions for the eDPSIR causal networks, which is an enhanced organization tool to understand the multi-level relationships in environmental and social issues. The developed pasture dimension set evaluates the rural-ecological commons in relation with the actor relations and geographical aspects during the decision-making, common management and planning processes.

Key words: commons; pastures; enclosure movements; eDPSIR; causal networks, sustainable management

EFFICIENCY OF THE RISK MANAGEMENT PROCESS IN THE PROJECTS FOR THE GROWTH OF COMPETITIVENESS OF AGRICULTURAL HOLDINGS AT THE LEVEL OF PRIVATE ORGANIZATIONS

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Abstract: At the present stage of scientific research in the economic field, the risk has both negative and positive significance, being characterized by the likelihood of occurrence, along with the impact experienced as a consequence of its manifestation. Thus, the risk of the project is defined by the probability and impact of an event that can influence positively or negatively the achievement of the objectives proposed for the successful implementation of a project at an organization level. The interdisciplinary character, promoted at the level of the present research, determined the application of managerial concepts specific to risk philosophy, managerial psychology, project management, risk management, and leadership. Throughout the design of the whole research, we have used general-scientific research methods such as: systemic analysis, comparative analysis, structural-functional, induction and deduction, synthesis and generalization etc. Among the methods of collecting the information, the observation, the survey based on the questionnaire and the structured interview were used to conduct the survey.

Key words: organization, competitiveness, risk, project

o2-10 – oral

WIND FARM CONFLICTS AT RURAL-ECOLOGICAL COMMONS: CASE OF PASTURES IN IZMIR

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Abstract: The growing urbanization trend requires new infrastructural developments, especially for meeting the needs of its energy hunger, which are exposing great pressures at the rural-urban fringe. The disappearance of the borders between the urban and the rural areas, and the ascending urban type investment pressure towards the rural requires a “right to the village” attitude in order to prevent the loss of the rural areas. Today, the villages of Turkey are facing the threat of transformation into neighborhoods by the 6360-numbered Metropolitan Law, as well as the rural common lands are being enclosed by several initiatives, legislations and malpractices, paving the way for new infrastructural developments such as renewable energy developments. The renewables, on the other hand, are taken as an eco-friendly type of development, which has political and social legitimacy due to the global concerns on energy-related environmental problems. However, since the wind farms started to locate especially on the rural common lands, several conflicts emerged. This study aims to reveal the fundamental conflicts at the rural-ecological commons in relation with the transformative impacts of the enclosure movements of the wind farm deployments, by focusing on the importance of the pastures as the rural-ecological commons. Pastures are crucial in terms of their rich biodiversity, rural development, erosion prevention and rural tradition. The case study areas at the rural-urban fringe of İzmir are examined in relation with the recent regulations, determination, delimitation and allocation processes, malpractices and the civil responses in relation to wind farms. The data gathered from the in-depth interviews with local people, professionals and village headmen, personal observations and the media analysis are evaluated within the content analysis in order to determine the fundamental conflicts at the local scale related to wind farm initiatives. The results and the recommendations aim to reveal the conflicts and the possibilities to transform them into potentials on behalf of both the wind energy developments and the rural-ecological commons.

Key words: commons; rural-ecological commons; pastures; renewable energy; wind farms; enclosure movements

MULTIFUNCTIONALITY AND NEO-PRODUCTIVISM: AN APORIA FOR RURAL AREAS?

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Abstract: The increasing phenomenon of land abandonment occurs in areas where traditional food and handicrafts products, were produced and where many ecosystem services are provided. At the same time the concentration of production in specialized and intensive farming systems localized in plain areas are, quite often, accompanied by pollution and degradation of natural resources. This dichotomy is happening in a policy environment “colonized” at the same time by the rhetoric of multifunctionality of rural areas and, in the recent years, by the so-called neo-productivism. The latter, translated into the sustainable intensification imperative, can be interpreted as the response to a neoliberal paradigm diffusion and to the climate change and global population prospects. In this paper an analysis of the rural development measures implemented in the last two programming phases is performed. Specifically, the selection criteria adopted to support investment projects have been analyzed in the different areas of the Campania region. What emerges, regardless of statement of principles, is a clear tendency to divert resources from internal/marginal rural areas that urge support, to fulfill what the modern society increasingly is asking for. This process clearly contrasts and weakens the other policies measures developed to address the problems of internal rural areas.

Key words: sustainable development, rural areas, multifunctionality, neo-productivism.

ANIMAL MANURE AS BIOFUELS IN AGRICULTURE

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Abstract: Animal manure is oldest organic/ecological fertilizer used in agriculture. It is result of mixing animal excrements and straw used as floor cover. Animal manure represents universal fertilizer and source of humus, micro and macro nutritious element, useful microorganisms which directly and positively influence on chemical, physical and biological soil characteristics. Chemical content of animal manure depend of animal breed, type of animal feed, fermentation and use. One cow (500 kg) produce annually around 15 tons of fresh manure or 11 tons of mature manure, one horse produce around 10 tons of fresh manure or 8 tons of mature manure. Production rate of animal manure for other breeds of domestic animal is in direct relationship with their size and weight. Mature animal manure can be applied to soil year around; in our region manure is applied during spring, summer and autumn. Nitrogen from animal manure need certain period of time to be transformed in soil and ready to use. Best condition for manure fertilization is during cold and humid weather conditions, in our regions mainly during March and April. From second decade of April to end of May, weather conditions are windier and sunny which made conditions less favorable for fertilization. Loss of nitrogen can be on high scale (big part of nitrogen can be lost trough out air, so windy and warm conditions have negative influence, even aero bio pollution can occur). Fertilization during summer or early autumn can result in poor use manure and economical losses. Adequate time for fertilization depends from climatic conditions, soil structure and maturity of animal manure. In arid or semi-arid climatic conditions manure should be use much earlier before sowing, on sandy soils manure should be applied just before sowing. Animal fecal matter is animal basic physiological by-product, which in the cycling of organic matter in nature from ancient times used for fertilizing crops. Stabilization of waste is physically and /or chemical process of decomposition and transformation of waste constituents in a homogeneous end products for reuse, with reduced unpleasant odors and vapors of organic compounds.

Key words: manure, animal, biofuels, green chemistry

APPLICATION OF DEEP EUTECTIC SOLVENT IN EXTRACTION OF BLACK MUSTARD (*BRASSICA NIGRA*) SEED OIL

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Abstract: Black mustard (*Brassica nigra*) is a weed that grows mostly in grain fields, gardens, orchards, and waste places. It is used as a spice and its oil can be used for biodiesel production because it is cheap and produces no production cost prior to harvesting operation. Besides conventional organic solvents, some ionic liquids and deep eutectic solvents (DESs) were also used in biomass treatment prior to biodiesel production. In this study, extraction of oil were performed by cold pressing and by extraction with organic solvents (*n*-hexane or trichloroethylene). The seed-to-solvent weight ratio was 1:10 and the extraction of oil was performed at 65 °C for 3 h. In order to improve the extraction, seeds were pretreated with DES for 24 h at room temperature. This DES was prepared by combining triethanolamine and glycerol in molar ratio 1:2. The physico-chemical properties of both DES and extracted oil were determined by standard methods. Triglyceride (TAG) contents in the extracted oil were determined by HPLC analysis. With *n*-hexane and trichloroethylene the oil yields were 22.23 and 25.36 wt.% to dry seed, respectively. When DES was combined with *n*-hexane, the separation of oil did not occur. When triethanolamine: glycerol (TEOA: GL) DES was used in system of combined solvents in seed: DES: methanol: trichloroethylene weight ratio of 1:5:5:10, the extracted TAG yield increased by 114%, compared to the yield provided by extraction with only trichloroethylene.

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Key words: extraction, deep eutectic solvents, black mustard seed, solvent

o2–14 – oral

THE EFFECT OF EUTECTIC SOLVENT CHOLINE CHLORIDE: GLYCEROL ON THE COMPOSITION AND ANTIOXIDATIVE ACTIVITY OF ROSEMARY (*ROSMARINUS OFFICINALIS* L.) ESSENTIAL OIL

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Abstract: In recent years, there has been growing interest in the use of ionic liquids and eutectic solvents. Ionic liquids belong to the class of "green" solvents. Eutectic solvents, most often based on choline chloride, as a cheaper variant, represent their alternative. Ionic liquids and eutectic solvents tend to replace traditionally used solvents, so their application in the extraction of bioactive components and isolation of essential oils from plant material is increasing. Rosemary (*Rosmarinus officinalis* L.) is a perennial plant belonging to the family of Labiatae (Lamiaceae). Rosemary leaves contain approximately 2% of essential oil exhibiting analgesic, antispasmodic, adstringent, antioxidant and antimicrobial effects. Essential oil from rosemary leaves was isolated by conventional hydrodistillation using hydromodule of 1/15 m/v, as well as by distillation after plant material pretreatment with 10% v/v aqueous solution of eutectic solvent choline chloride:glycerol. Qualitative and quantitative composition of the oil was determined by GC-MS and GC-FID analysis. The antioxidative activity of rosemary essential oil was investigated by DPPH assay in terms of their possible application as natural antioxidants. The yield of oil isolated by conventional hydrodistillation was 1.825 cm³/100 g of plant material, while the yield of oil isolated by distillation from plant material which has been treated with eutectic solvent was 2.55 cm³/100 g of plant material. The results obtained proved the presence of 23 components in both isolated essential oils. Qualitative composition of essential oil was the same regardless of the distillation method applied, while the quantitative composition varied. GC/MS analysis has shown higher content of camphor, verbenone and borneol in the oil obtained by distillation from plant material with pretreatment by 10% v/v aqueous solution of eutectic solvent (33.26%, 12.22% and 8.30%, respectively).

Rosemary essential oil has shown the best antioxidant properties after 120 minutes of incubation. The oil obtained by distillation after pretreatment of plant material with eutectic solvent has shown better antioxidant activity (EC_{50} value: 8.77 mg/ml) compared to oil obtained by classical hydrodistillation (EC_{50} value: 23.61 mg/ml), which is probably due to the higher content of the most abundant components. On the basis of the obtained results it can be concluded that 10% v/v aqueous solution of eutectic solvent choline chloride:glycerol can be used in the isolation of rosemary essential oil not only in order to increase the yield, but also for obtaining oil with better antioxidant activity and higher content of camphor, verbenon and borneol.

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Key words: *Rosmarinus officinalis* L.

o2–15 – oral

SYNTHESIS AND BIOLOGICAL ACTIVITIES OF SILVER NANOPARTICLES STABILIZED BY AQUEOUS EXTRACT FROM STRAWBERRY (*FRAGARIA X ANANASSA* DUCH.) LEAVES

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Abstract: Silver nanoparticles have been synthesized from AgNO_3 at room and boiling temperature. In order to develop green stabilization methods, the aqueous extract from grown strawberries leaves (*Fragaria x ananassa* Duch.) was used as a reducing and capping agent. Formation of silver nanoparticles stabilized by extract (AgNPs-E) has been monitored by Surface Plasmon Resonance (SPR) absorption band in UV-VIS spectra at ~440 nm. The synthesis of AgNPs-E is performed during 4 and 168 h at boiling and room temperature, respectively. The nitrate ions are removed from AgNPs-E by dialysis. The obtained complex has shown high stability based on the SPR band consistency during 12 days of samples staying at room temperature in the dark. Further characterization of synthesized AgNPs-E was performed by FTIR spectroscopy. Considerably reduction of the major peaks in the AgNPs-E spectra, in regard to spectra of the extract itself, indicates that molecules from the extract, containing oxygen and nitrogen functional groups (NH, (NH)C=O, CNO, C-O-C i OH), participate in reduction and stabilization of formed nanoparticles. Biological activity of synthesized nanoparticles has been investigated by antioxidative DPPH test as well as by a disk-diffusion test on *Bacillus cereus*, *Bacillus luteus*, *Bacillus subtilis*, *Escherichia coli*, *Listeria monocytogenes* and *Staphylococcus aureus*. The nanoparticles synthesized at room temperature have shown significantly higher antioxidative activity compared to those synthesized at boiling temperature indicating that extract components take a part in DPPH radical neutralization. In the same time, the synthesized particles have shown significant antimicrobial activity against tested microorganisms, except *Bacillus cereus*, in the selected concentration range. Again, the particles synthesized at room temperature have shown slightly higher antimicrobial activity against investigated microorganisms. Based on the results obtained, the silver nanoparticles stabilized

by aqueous extract from strawberry leaves can be used as a potential ingredient in cosmetic formulations for skin protection.

This work is a part of the Project TR-34012 financed by Ministry of Education, Science and Technological Development, Republic of Serbia.

Key words: *Fragaria x ananassa* Duch.,

o2–16 – oral

MEASUREMENTS AND CALCULATIONS FROM AN INSTALLED PV/T SOLAR SYSTEM IN THE KINDERGARTEN “PAVLINA VELJANOVA” KOCHANI

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Abstract: Kindergartens are one of the bigger consumers of electrical and heat energy. As a result of the limited installation area, hybrid (PV/T) collectors are the perfect fit for these kinds of objects. One hybrid collector is composed of an upper part of photovoltaic cell and below is the thermal part for hot water. The main objective of this paper is to present measured data about the performance of an installed solar system at a kindergarten in Kocani. This is the central kindergarten that has about 350 kids. Measurement equipment is installed separately for the thermal and electrical part. Calculations about how the installed capacity corresponds to the needs of the kindergarten are also included. All of the produced electricity is mainly used for lightning the hall, offices and backyard. On the other hand, thermal energy is consumed for preparing food and children's nurseries.

Key words: photovoltaic, thermal energy, measurements, kindergarten.

THE EFFECTS OF URBANIZATION AND HUMAN ACTIVITIES ON BASIN ECOSYSTEM: SAPANCA LAKE BASIN

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Abstract” Rapid population growth and urbanization in cities cause unhealthy development and construction of urban areas, thus need for nature of the citizens is increasing. This need, leads to increase in the demand for settling in rural-urban fringe and it is followed by rapid urbanization, degradation, depletion of the resources. Natural resources such as forest areas, agricultural lands, water resources take part at the top of the changing and consumed resources due to urbanization effect. Among these resources, water holds a strategic importance around the world. The lake basins are quite significant within the water basins. In this research, land use and land use change of the Sapanca Lake Basin which is one of the most important lake basins of Turkey were investigated. Remote Sensing (UA) and Geographic Information Systems (GIS) techniques were used to investigate the change of land cover and usage. Because of it's natural beauties, easy to access location and closeness to Turkey's most developed city, Istanbul, Sapanca Lake Basin has changed rapidly over the last 20 years. Until the beginning of the 1990s, the basin was dominated by the rural character, but today, urban activities have been more intense in this basin. The basin attracts a high amount of population due to the second housing and various tourism activities. This causes to exceed the carrying capacity and harm the natural environment of the basin. Sapanca Lake Basin is under pressure of settlement according to the results obtained from analysis of spatial change. The watershed, which has lost its fertile agricultural lands at first, faces the destruction of forest areas today. This process will increase rapidly if necessary precautions, measures and legal arrangements are not made. Like the areas that are becoming deforested and opening to settlement fully, in the future a similar situation may be experienced in the whole basin in the future. This will cause both destruction of the natural environment and the danger of the destruction of a significant freshwater source. In this context, an integrated

watershed management plan for the watershed needs to be established and applied immediately. Only in this way the sustainability of the basin and its survival for future generations will be achieved.

Key words: urbanization, natural resources, human effect,
Sapanca Lake Basin.

ORAL SESSION

3

HEALTH AND ENVIRONMENT, LEGAL FRAMEWORK – GIS AND REMOTE SENSING CONTROL



CHANGE OF NATURAL MAGNETIC FIELD IN BED AS A CAUSE FOR HEALTH IMPAIRMENT

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Abstract: Deformation of the natural magnetic earth field by introducing ferromagnetic objects and electrical devices leads to the creation of an anomalous magnetic field (AMP) in which a person resides. Defining these anomalies in relation to the natural magnetic field may be done by measuring the magnetic field using proton magnetometer. Another way of determining the new field distribution is numerical calculation of the magnetic field by numerical methods. The longest period of time a person resides in bed is in a static position, and according to scientific facts the magnetic field change has significant impact on health. Therefore, it is important to carry out calculation of the magnetic field for different construction types of beds with mattresses with ferrite core (springs). The paper consists of the following sections: The first section provides an overview of the latest scientific information of the influence of the magnetic field on the functioning of the cell, tissues, organs and biological system. In the second section, calculation of the field in the bed area for particular bed constructions, such as single bed, bed with a back with a ferrite core and a double bed on two levels was carried out. Validation of the obtained results was performed. In the third section, measurement of individual subjects using magnetic field proton magnetometer was performed and the obtained results of the measurement of anomalous magnetic field were connected with the impaired health status of these patients. The conclusion was drawn and the directions for further research were suggested.

Key words: magnetic field and anomalous magnetic field, numerical simulation of magnetic field, effects of magnetic field on health, a person in magnetic field

**PLANNING FOR GREEN AREAS
IN CONTEMPORARY “PARK-POOR”
NEIGHBORHOODS: A SPATIAL EQUITY-BASED
APPROACH USING GEOGRAPHIC INFORMATION
SYSTEMS, IZMIR CASE (TURKEY)**

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Abstract: This study argues that regardless of their sizes, neighborhood parks are significant parts of urban green environments. They contribute to the continuity of biodiversity, sustainability and improvement of individual/communal physical and mental health. Meanwhile, such green public spaces are planned under the influence of multi-factors, which not always prioritize these significances and also “equitable” access to these areas by various social groups. As in the case of Izmir City (Turkey), ultimately, some of our neighborhoods get “more green” while others have “less” or none. Often, the latter (or “park-poor” areas) has also high percentages of children, elderly and low-income and poor people—that is, the social groups that need to get access and use daily green areas in walking distance to their home. We argue that it is not too late for developing new green spaces in “park-poor” urban areas. Using tools of Geographic Information Systems (GISs) and relying on spatial equity-based approaches, this study presents our methods and results about how to determine the locations of new green public areas (or parks) at the neighborhood level in “park-poor” areas of Izmir (Turkey). It contributes to the discussions about the distribution of green areas in cities and city groups’ access to these public service areas as part of environmental justice issues (Heynen, 2004; Rich, 1979; Harvey 1996; Keil and Graham 1998; Swyngedouw and Heynen 2003). Also, arguing that green areas are public resources, this study emphasizes that urban planning policies must re-plan neighborhood parks based on the need-based (rather than equality-based) equity that favors accessibility of neighborhood parks primarily by children, elderly, women and low income groups (Lucy, 1981; Talen, 2007, 2010). Lastly, with its spatial scales of investigation and its data, our study differs greatly from earlier studies. Using GISs, this literature within spatial-equity approach investigates mostly green public areas at the city

level in “data-rich” countries. After determining the park-poor areas in the city level of Izmir, this study takes a further step and suggest potential locations for new parks in a sample of park-poor neighborhoods. To develop these suggestions at the neighborhood-level, we develop a set of data through spatial and statistical analyzing tools in GIS, which can assist also local communities and city municipalities aiming to develop green public areas.

Key words: neighborhood parks, healthy urban environment, need-based equity, geographic information systems.

PHYSICAL ATTRIBUTES OF URBAN GREEN AREAS AFFECTING “MARGINALIZED” GROUPS ACCESS TO HEALTHY ENVIRONMENTS IN WALKING DISTANCE: A CASE OF IZMIR (TURKEY)

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Abstract: Urban green areas are significant for enabling people to contact with nature and contributing to their physical and mental health. Part of larger green systems, neighborhood parks have particular importance because they are located nearby home environments where children, women and elderly spent relatively longer time. However, despite of such characteristics, in daily life, not all neighborhood parks are used widely by residents, especially children, women, youth and elderly. We argue that these groups are usually “marginalized” in planning of green areas. Focusing majorly on the physical attributes in and nearby neighborhood park areas, this study investigates the reasons for these groups’ use and under- or non-use of neighborhood parks. To gather data, we had field observations in 32 neighborhood parks in 3 districts, Izmir (the third biggest metropolitan city of Turkey). These districts are the most “green” areas linked with major environmental corridors and have the highest square meter of park areas per capita number in Izmir. We gathered data about the physical attributes in park areas (i.e., basic services, facilities, open areas, landscape elements) and at nearby park area (i.e., land uses, building density, street networks, and population density) and also about user characteristics (i.e., number, age, gender) and dominant use characteristics. With the help of statistical analysis (T-tests and regression analyses), we interrelate these variables. Also, with the tools of Geographic Information Systems, we map both the data and also the results in relation to broader natural environmental corridors as well as built environment. We present the results to underline what kind of physical attributes in and nearby the parks are significant to attract children, women, youth and elderly to these green areas. The findings will contribute both for creating healthy environments as contact-points with nature for these usually “marginalized” groups and also for leading public investments in neighborhood parks.

Keywords: Neighborhood parks, healthy environments, children, elderly, women

CELLULAR AND MOLECULAR ALTERATION AS BIOMARKERS FOR XENOBIOTIC EXPOSURE

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Abstract: Biomarkers have been defined by the U.S. National Academy of Sciences Committee on Biological Markers as an alteration in cellular or biochemical components, processes, structure or functions that is measurable in a biological system or sample. They are measurable in biological media such as human tissues, cells, or fluids. More recently, a National Institutes of Health (NIH) working group broadened this definition to include “a characteristic that is objectively measured and evaluated as an indicator of normal biological processes, pathogenic processes, or pharmacological responses to therapeutic intervention.” The alteration include modifications in some parameters of blood composition, alterations of specific enzyme activities, DNA-adducts appearance, localised mRNA and protein increases, and appearance of specific antibodies (autoantibodies) against a xenobiotic or a particular cellular fractions. Xenobiotics have been defined as chemicals to which an organism is exposed that are extrinsic to the normal metabolism of that organism. A xenobiotic is define as a chemical that is not used by the reference organism for maintenance of normal physiologic/biochemical function and homeostasis, and dose not constitute a part of the conventional array of chemicals synthesized from nutrient chemicals by the reference organism in normal intermediary metabolism. Aim of this presentation is to focusing on the use of cellular and molecular alteration as biomarkers for xenobiotic exposure of organism. The presence of a xenobiotic in the environment always represents a risk for living organisms. the relationship between the toxic levels within the organism and the toxic response is rather complex and has a difficult forecast because it depends on several factors, namely toxicokinetic and genetic factors. The cellular alteration and some cellular macromolecules confirme the interaction with xenobiotics and its potential impact on the organisms.

Key words: biomarkers, biomonitoring, environment, health impact

FINDING ORPHAN RADIOACTIVE SOURCES IN SCRAP METAL LOADS.

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Abstract: Scrap metal is traded worldwide as a valuable resource. Increasingly more steel is being produced from scrap metal due to its availability and the energy saved from this process. More than 40% of new steel produced worldwide comes from recycled scrap. It is therefore understandable that potential consequences that may arise from orphan radioactive sources usually found inside the scrap metal are one of the most feared problems within the metal industry. An orphan source is a radioactive source that is no longer under proper regulatory control. In order to prevent accidental melting of scrap with orphan radioactive sources and hence to avoid economical losses and factory contamination, steel industries are installing portal monitors at the entrance point of their installations. Moreover, checks with handheld radiation detection instruments are being performed. In order to find and locate a probable radioactive source in scrap, usually a scan of scrap metal load with a handheld instrument – as near as possible to the load – should be performed. In the present work, study of two different radioactive sources (Co-60 and Cs-137) which are the most prominent radioactive sources used in industries and medical uses were taken into account. Different thicknesses of lead shields covering radioactive sources were considered. Also, different densities of scrap metal and radioactive source locations were studied. The Minimum Detectable Activities in different situations (concerning the type of radioactive sources, location of them and scrap type) using Monte Carlo simulations were estimated. This is helping competent authorities and industries to know the limits of detection for their equipment, estimate probabilities of a radioactive source not to be identified and optimize the way of handling inspections in scrap metal loads. Real incidents with orphan sources in scrap loads taken place in Greece and the ways they were handled are presented and discussed in the current work.

Key words: scrap metals, orphan sources, radioactivity, minimum detectable activities, radioactive contamination

AUTOMATIC DELINEATION OF SUB-BASINS FROM ELEVATION LAYERS IN GIS, BASED ON HORTON-STRAHLER HIERARCHICAL SYSTEM

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Abstract: Hydrological studies are highly scale-dependent and require several approaches, in order to be relevant in flood risk analysis. For a more comprehensive study regarding flood risk based on drainage basins, several levels of analysis should be undergone. This study describes a model conceived for automatically generating vector shapefiles with all the sub-basins in a given, larger drainage basin, based on a Horton-Strahler hierarchy system. With minimal input from the user, based on a single digital elevation model (DEM), a single vector layer can be generated, associated to a single order of magnitude, on the Horton-Strahler classification. This approach replaces the alternative manual and time consuming method, offering a base layer for further analysis, in a matter of minutes/hours (depending on the size of the input elevation file), which otherwise would have taken days/weeks of digitization. The model imposes no limits, regarding the maximum input area that can be selected as input, but the results are directly dependent on the processing power of the computer, on which it is generated. The final results are useful in flood risk analysis, comparative drainage basin studies, management studies etc.

Key words: drainage basin, GIS, hydrology, Horton-Strahler, vector

ENVIRONMENTAL RESPONSIBILITY OF MEMBER STATES OF THE EUROPEAN UNION

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Abstract. One of the priority values of the modern legal systems in the world is the concept of environmental protection. Modern legal structures, i.e., supranational organizations, such as the European Union, have introduced the concept of environmental protection, i.e. liability and compensation for damage caused by wrongful acts directed against environmental values, as one of the fundamental principles firmly embedded in their legal system. Directive 2004/35/EC and Directive 2008/99/EC establish the legal framework for environmental liability systems of EU Member States. The first Directive 2004/35/EC does not deal with civil liability with regard to the prevention of environmental damage. By virtue of this piece of legislation, the EU establishes the framework of administrative liability with regard to the prevention and remedying of environmental damage (ELD) based on the polluter pays principle. Directive 2008/99/EC on the protection of the environment through criminal law lays down the principles to be followed by Member States in the field of environmental criminal law. Environmental crimes are becoming increasingly recognized as a serious threat to the “rule of law” systems, including the European Union which relies on the rule of law as one of the common values upon which the union is founded. In this regard, the implementation of Directive 2008/99/EC should be seen as an important instrument of fight against environmental crime. The aforementioned Directives are two most important legal documents that call on Member State to take responsibility for environmental protection. The authors conclude that with regard to liability for protecting the environment against damage, it is of crucial importance for EU Members States and Candidate Countries to implement the standards set out in the EU Environmental Directives.

Key words: European Union; environmental damage; environmental law; harmonization.

ASSESSING THE ROOM FOR GROWTH IN THE CASE OF ACCOMMODATION BUSINESSES FROM ROMANIAN HOSPITALITY INDUSTRY

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Abstract: In recent years, the Romanian accommodation business sector has recorded a dramatic increase of the accommodation units, but even under these circumstances it is below half the average registered by the European Union. The study aims to evaluate whether there is still room for sustainable growth. In this view there are assessed the accounting–financial indicators for 17 years collected for the period 1999 – 2015 for all the accommodation units in Romania and Europe. For data processing and assessing the room for sustainable growth we used the simple regression and enshrined procedures for analyzing competitiveness: the distance method and the geometric mean method. The findings show that there is only a small room for development for Romanian accommodation businesses referring to the European average correlated analyzed aspects. Some managerial decision suggestions are provided in the end of the paper for accommodation business growing, related to accounting-financial issues.

Key words: accounting-financial issues; sustainable growth; accommodation businesses.

PERFORMANCE COMPARISON OF DIFFERENT FUEL CELL TECHNOLOGIES

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Abstract: Fuel cells are technologies which are a promising way to provide energy for portable devices and most importantly, rural areas. In the last few years, new fuels and materials have attracted lots of attention and efforts have been made in developing new technologies. The aim of this paper is a comparative study of different fuel cell technologies, working principles, fuels, fuel concentration and operating conditions. The advantages and disadvantages of the different types of fuel cells are presented in this paper as well. In addition to this, there is a closer look and comparison of passive direct formate fuel cells and other fuel cells, because DFFC use carbon-neutral fuel as well as low-cost electrocatalytic and membrane materials. The performance testing is done with an ARBIN machine interfaced to a computer. In order to determine the performance of the DFFC, several tests are conducted including the testing of the open circuit voltage, internal resistance, polarization curve as well as the power density. The results indicate that the progress in the fuel cell technologies is higher and higher and different types of fuel cells need different working principles, materials, fuel concentrations as well as operating conditions. The current paper includes the latest work, progress and efforts that have been made in improving the fuel cell technologies.

Key words: renewable energy, energy efficiency, carbon neutral fuel, formate, performance, sustainable development

ANALYTICAL SYNTHETIC ANALYZING IN DEFINING CRITERIA, SUB-CRITERIA AND ALTERNATIVE SOLUTIONS FOR MULTICRITERIAL MODELING FOR INVESTMENT DECISIONS

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Abstract: Through the analysis of literature, a review of different approaches and theories related to optimal model choice and decision-making is given. It is embedded in theory of capital and macroeconomics in order, the ranking to not only be reduced to a mathematical operation but to show understanding for every detail of preparations for making investment decisions. The criteria for multi-criteria modeling for the specific task have been defined. Analytical synthetic analyzes and goals, criteria, sub-criteria and alternative solutions of the system model were made. Twelve criteria and 18 subcriteria have been introduced. Three alternatives have been identified: A_1 – power plant, A_2 – irrigation and A_3 – recreation and flood protection. Data are given on the geographical position, the socio-economic situation and the qualitative aspect. The numerical processing of the system model is realized. The hierarchical structure of the developed model is established, evaluation of the values and weighting coefficients on some of the determined criteria and subcriteria has been carried out.

Key words: Methods in business decision-making, ranking, selection and application

RANKING THE CRITERIA FOR MULTICRITERIAL MODELING AND PRESENTATION ON RESULTS WHEN MAKING INVESTMENT DECISIONS

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Abstract: A discussion of the results is presented with the development of the system model for making an investment decision. The impact of the criteria and sub-criteria on the ranking of the identified alternative solutions was discussed the sensitivity analysis and the definitive ranking of the criteria were given. It is concluded that the developed model becomes a useful tool for ranking, and the ranking is a useful tool for making investment decisions. The same has been done with the establishment of comparative matrices and target functions in the software tool EC 2000. Subsequently, the degree of compatibility of the matrices for the established criteria and sub-criteria is determined, where it is shown that there is a high match of the results and the model created can be used and given real results in the ranking. Results were obtained corresponding to the assumed goals of the research. A model has been developed for ranking the criteria for multi-criteria modeling when making investment decisions in the field of water resources. The model can be applied by decision makers as an aid for the impact analysis of any criterion and sub-criterion. The method provides an opportunity to compare the obtained results from the ranking with assumed alternatives to the investment decision.

Key words: Methods in business decision-making, ranking, selection and application

ORAL SESSION

4

AGRICULTURE, FORESTRY, AGRO ECOLOGY, FOOD QUALITY SAFETY



o4-01 – Key speaker

THE EFFECT OF SOIL ACIDITY ON WINTER WHEAT GRAIN YIELD

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Abstract: Soil acidity is considered to be a limiting factor for the effective plant growth and successful farm management in many agricultural farms in Croatia. At the lowlands of Pannonian agricultural region there are almost 80% of acid soils. There are especially distinguished two types of soils – Pseudogley (42%) and Luvisol (40%), the remaining types of soils (Ranker, Distric brown soil, Luvisol, Pseudogley-gley, Hydromeliorated pseudogley, Hydromeliorated pseudogley-gley) occupy 15% . Because of negative influence of soil acidity on the yield of arable crops, we have studied the effect of soil acidity on the yield of winter wheat. Since 1996, research with different amounts of mineral nitrogen fertilization (0-300) was conducted on the experimental field in Popovača. During the vegetation year 2011/12 winter wheat was grown as a test crop. Soil was sampled in 2010 when 200 individual soil samples were obtained from experimental area of 4 ha, for the analysis of spatial distribution of soil pH. The harvest of winter wheat in 2012 was carried out according to the rules of precision farming. In 2012 total of 180 individual grains weights was harvested. Winter wheat grain yield was calculated in t/ha. The method used for mapping grain yield spatial distribution according to the fertilization treatments is known as „ordinary kriging“, a geostatistical method, with regular sampling grid of 15x15m. The absolute range of yield values ranged from 0.12 to 9.23 t/ha. Comparison of the soil pH spatial variability indicated decisive effect of the soil pH value in arable layer on winter wheat grain yield, regardless of the mineral nitrogen fertilization level.

Key words: soil acidity, whinter wheat, grain yield, spatial variability.

o4-02 – Key speaker

A RESEARCH ON DETERMINING THE EFFECTS OF DIFFERENT SOIL PROPERTIES ON SPECTRAL REFLECTANCE VALUES OF CROPLANDS

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Abstract: Usage of remote sensing techniques and Geographical Information Systems (GIS) in agricultural activities is becoming more and more popular. Benefitting from remote sensing, essential functions including crop land coverage estimation and monitoring can be achieved. Considering the fact that reflectance values of same product type can differ with respect to soil characteristics, this research aims to investigate relationship between soil properties the cropland reflectance values. The canopy rates of cropland also effects reflection values significantly. In this study 104 wheat-barley parcels and 26 potato parcels in Central Anatolia region of Turkey were chosen from two different districts, Haymana and Bünyan. To disclose the relationship, images from Sentinel 2 and Landsat 8 satellites are downloaded for predefined parcels during one season of production(March to December 2017). Image Analyst, ArcGIS programs and also Agrovisio®© software were used in preprocessing steps of satellite images and getting digital numbers of pixels. Soil properties are affected by cropland characteristics such as water holding capacity, organic matter content, mineral components. Different soils characteristics yields variability on reflection which is expressed as digital numbers especially; soil color is one of them. On the other hand, the canopy of crop is connected with its phenological stages. Digital numbers (DN) of satellite images have been changing according to species' phenological stages for each band. Therefore, soils cannot be shown any standardization on reflection values even same crop species. In this research, two crop species on different soil colors is investigated. Dark color soils have high organic matter percentage and much moisture content that are increasing their absorbance legibility for each band. However, light color soils have much more felsite minerals inside and lower water holding capacity that have higher reflection values for each band. As a consequence of this research, soil properties which are soil color, water holding capacity, mineral composites should be consider for determining reference reflection values of cropland on those soils.

Key words: agriculture, soil properties, remote sensing, GIS.

AGRI-ENVIRONMENTAL REFORMS OF EUROPEAN UNION IN THE PERIOD OF 2014–2020 AND EFFECTS ON TURKEY

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Abstract: The necessity of fair distribution of agricultural supports among member countries, the re-evaluation of support policies to consider the rising of price volatilities and environmental concerns, and the recent food crisis with the danger of global warming are the main reasons for the reforms of Common Agricultural Policy (CAP), which covers the period 2014-2020, in European Union (EU). EU agriculture needs to attain higher levels of production of safe and quality food, while preserving the natural resources that agricultural productivity depends upon. Therefore, new CAP away from product based support towards producer support and considerations for the environment. The most important of this new support is “greening”. Greening can be defined as making environmentally friendly production and emphasis importance to the protection of the environment. This new policy instrument is one of the payments that in the first pillar of the CAP. Given the pressure on natural resources, agriculture has to improve its environmental performance through more sustainable production methods. From 2015 onwards, the CAP introduces a new policy instrument in the first pillar, the Green Direct Payment. Accordingly, producers have to implement 3 agricultural practices compulsorily. These are maintenance of permanent grassland, ecological focus areas and crop diversification. Besides all these, producers who do not present products to the market but keep the land in good and clean environment conditions have get supports. Measures determined by the new reforms are agri-environmental-climate measures, organic farming, Areas of Natural Constraints (ANC), Natura 2000 areas, forestry measures and investments which are beneficial for the environment or climate. This study aims to evaluate reforms that will be implemented in the period of 2014-2020 in CAP specific to agri- environment and these reforms are aimed to be examined in terms of Turkey that continued negotiations with the EU. The study is based on literature. In this frame, examination, synthesizing and establishing relationships of sources was followed.

Key words: European Union, agri-environmental measures, Turkey

SOCIO-ECONOMIC CONSIDERATION IN GMO DECISION-MAKING PROCESS IN TURKEY

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Abstract: Modern biotechnology has found its largest area of utilization in the agricultural sector. The structures of conventional culture types and their wild relatives are modified in order to produce high amount of and quality crops. Cultivation area of GMOs, whose production has started in 1996, has multiplied more than 110 times and from 1,7 million hectares, it has now reached 185,1 million hectares in 2016. Taking necessary steps by defining the disadvantages of modern biotechnology on biodiversity, human health and social structure requires the “Biosafety System”. Biosafety is defined as the guarantee for safe use of biotechnology. Biosafety is a concept covering the risk assessment and risk management. Risk assessment is consisted of scientific risk assessment and socio-economic consideration. In some cases, scientific risk assessment may be insufficient in risk management and at this point, socio-economic consideration gains importance. The first binding legal document on global scale regarding the international movement of the GMOs, Cartagena Protocol on Biosafety (CPB) grants the countries the right to consider the socio-economic costs in the approval process of GMOs import. However, the number of countries performing socio-economic evaluation in this process is limited. Up to now 35 countries have included socio-economic evaluation in the national biosafety regulations. Even though it is not in the literature yet, with the Law on Biosafety legalized in 2010, Turkey has become one of the countries that make socio-economic evaluation obligatory in GMO’s market launch. This study has focused on why and how the socio-economic evaluation, which is mandatory before authorizing the import of GM agricultural products, is/should be conducted.

Key words: socio-economic consideration, GMO, import decision, Turkey

COMMON FORESTRY POLICY IN THE EUROPEAN UNION. REALISTIC SCENARIO OR UTOPIA?

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Abstract: The European Union has a long history of policies about the environment; one of the oldest is the Common Agricultural Policy, which has already been reformed three times. On the other hand, the forestry sector in the European Union lacks a Common Policy, as the Treaties of the European Union make no provision for Common Forestry Policy. The aim of this paper is to examine if the members of the European Union are ready to develop a Common Forestry Policy and if two key issues of today, climate change and the economic crisis, affect the progress of that scenario. A thorough literature review was conducted with emphasis in the documents of the EU regarding forest policy such as the Thomas Report, the EU Forestry Strategy, the European Commission's document "Sustainable Forestry and the European Union" and documents of the Standing Forestry Committee. The Member States apply each a unique Forest Policy taking into consideration the special characteristics of the forest area in their countries, the defined legislation and institutional framework, and the rights of ownership. However, despite the differences in the implementation of the Forest Policy among the member states of the European Union, the adoption of a Common Forestry Policy seems possible in the near future. The economic crisis and climate change constitute major threats for modern Forestry that could severely damage the forests in Europe and worldwide. The origins of the Common Agricultural Policy in Europe are instructive: the World War II devastated the agricultural sector across Europe and led to the creation of a Common Agricultural Policy with primary objective the insurance of sufficient food supplies for the European citizens. In the same way the creation of a Common Forestry Policy could contribute to providing solutions against climate change and economic crisis.

Key words: Forest Policy, European Union, Forestry Strategy, Common Agricultural Policy.

EVALUATION OF DAIRY ESTABLISHMENTS IN TURKEY WITH REGARD TO FOOD QUALITY AND SAFETY IN EUROPEAN UNION PROCESS: THE RESEARCH OF ANKARA PROVINCE

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Abstract: In Turkey, the quality and safety of food products have become increasingly important as a requirement of the international relations and trade with the European Union (EU). EU harmonization studies have brought in legislation related to food safety. In the framework of negotiations with the EU, it is stated that food establishments meet EU hygiene standards and legal arrangements should be made to ensure their renewal by taking into account their operating capacities within the chapter “Food Safety, Veterinary and Plant Health”. One of the important sub-sectors that need to comply with the legal regulations is the dairy sector. This study aims to examine the attitudes, opinions and ideas of the authorities of food establishments producing milk and milk products on issues EU hygiene standards, quality and safety of milk and milk products, living problems etc. The basic material of the study is the results of the questionnaire applied to the officials of authorities of food establishments producing milk and milk products in Ankara during the process of harmonization with EU food legislation. As a method, the Full Count Method was used and was interviewed with the authority of 15 dairy establishments. According to the information obtained from the research results; it is understood that 66.7% of the authorities do not have sufficient knowledge about EU legislation. In addition, 53.3% of food establishment authorities see the supply of quality raw milk for the dairy sector as a significant advantage in the consequence of full membership to the EU. Furthermore the lack of a good organizational structure negatively affects the sustainability of the existing dairy sector in terms of the supply of quality raw milk in Turkey. In order to compete in international markets, raw milk quality must first be brought to the competitive level.

Key words: food quality and security, milk establishments, European Union food legislation, EU harmonization process

NONWOOD FOREST PRODUCTS AS AN INSTRUMENT FOR RURAL DEVELOPMENT: PERSPECTIVE OF FOREST VILLAGERS FROM ISTANBUL

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Abstract: Nonwood forest products (NWFP) related issues have been taken place among the emerging strategies of rural development in recent decades. Production and marketing of NWFPs has economic, social and environmental impacts on rural development. At this point the problems, attitudes and expectations of rural dwellers who work as producers gain importance in terms of strengthening the contribution of NWFPs to rural development. In this context, the aims of the paper were to determine the contribution of local people in NWFPs' producing process, to analyze the effects of this kind of products on rural development and to examine the related demands of local people. In order to achieve the aims, questionnaires were applied to the forest villagers from European and Asian sides of Istanbul and 129 villagers were participated to questionnaire survey. The data was analyzed by descriptive statistics and comparative analysis. It was found out that there are some problems on relations between forest and villagers and also NWFPs don't have direct effect on rural economic livelihood, however the products contribute rural food supply. Thus, i) legal instruments, ii) regulatory instruments, iii) economical instruments (taxes and incentives), iv) information-based instruments (education-research), v) public relations and participation should be strengthened to increase the contribution of NWFPs to rural development.

Keywords: Forest policy, rural development, nonwood forest products

REMOTE SENSING AND GIS USE IN THE MANAGEMENT OF AGRICULTURAL RISKS RELATED TO CLIMATE CHANGE

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Abstract: Agriculture is an important strategic sector in the nutrition, employment and development of the countries. At the same time, it is also considered a sensitive and strategic sector since production is affected by natural conditions. Feeding the world can only be achieved through food safety and sustainable production. The world is faced with the danger of starvation especially due to climatic changes in the recent years and global warming in this context. Turkey is also in the region that is under the influence of climate change. The rapid decline in the water resources significantly affect agricultural production. Agricultural sector needs to be sustainable and developed by minimizing the agricultural risks in order to feed the growing world population adequately and regularly. In this context, it is very important to monitor cultivated areas in the management of agricultural risks and to determine at what level the climate change will affect. Losses that may occur in agricultural production can be predicted earlier by using remote sensing techniques. In addition to the climatic data, topography, soil and land features can be collected in a GIS database to form an effective risk management model. The objective of this study was to examine the assessment and monitoring of crop cultivated lands and the probable low yields that might occur due to dry seasons, plant diseases and disorders. In the study, the cultivated areas in Kayseri-Bünyan (Turkey) province were chosen as the pilot region. In this area, the main soil properties like great soil groups, depth, erosion, salinity-alkalinity, stony and topographic and physiographic properties of the land were determined. In the study, multispectral bands images of Sentinel-2, Göktürk-2 and Planet satellites were used in accordance with different growth and development (zadoks) periods of field crops. With respect to soil and crop design, soil fertility classes of the pilot region was determined by GIS using the data achieved by remote sensing and the data achieved by laboratory work. Findings were geographically mapped. Moreover, the level of influence/damage in each parcel due to probable yield decreases because of dry seasons, plant diseases and disorders was determined in detail.

Key words: agriculture, climate change, remote sensing, GIS.

APPLE QUALITY PRESERVATION WITH THE USE OF INTERMITTENT DRYING PROCESS

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Abstract: Intermittent drying process is studied by tempering apple rings during air drying. The investigation was performed using a three-level industrial type dryer. Multi-thermal zone convective drying process is applied, with different intermittent regimes, on three identical continuous flow dryers. The influence of air state (temperatures 35-85 °C, velocities 2-5 m/s) and drying intensity (5-10 hours per cycle) on dried product quality is evaluated through field work tests at three simultaneously operating plants. Correct drying conditions are reached.

Key words: food drying, apple, drying conditions.

COEFFICIENTS OF HEAVY METAL ACCUMULATION IN SOILS FROM DIFFERENT LANDSCAPES

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Abstract: The accumulation coefficients of Mn, Zn, Cu, Pb and Cd in the surface soil layers of Cambisols from the beech landscape of the Balkan Mountains and the coniferous landscape of the Rhodope Mountains were determined. The results of soil studies from the forest monitoring network in Bulgaria, obtained in the period from 1986 to 2016 were used, supplemented with data for the territory of the “Central Balkan” National Park and “Bulgarka” Natural Park. The soils were divided into two groups – with $\text{pH}_{\text{CaCl}_2} < 4.2$ and with $\text{pH}_{\text{CaCl}_2} > 4.2$, where the behavior of the metals is different. The higher values of the accumulation coefficients were determined in acidic soils in comparison with the ones obtained for the soils with $\text{pH}_{\text{CaCl}_2} > 4.2$. The maximum coefficients are 5.90 for Mn, 5.45 for Pb, 2.55 for Cu, etc. The high values are due to the influence of the litter enriched with heavy metals and to naturally occurring accumulation processes in the surface soil layers in the conditions of high mobility of metals in the acidic soils. The coefficients could serve to distinguish the naturally occurring accumulation processes from aerosol contamination with heavy metals. They allow to perform contamination risk assessment of grass species in pastures, medicinal plants, mushrooms, etc., as well as the development of criteria for their protection.

Key words: heavy metal, accumulation coefficients, forest soil, soil pollution, landscape

ASSESSMENT OF THE INDICATOR RELATIVE OXYGEN-FEED RATIO (OFR) IN A RAINBOW TROUT (ONCORHYNCHUS MYKISS) CULTIVATION PLANT

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Abstract: We have analyzed 2 important ratios that are connected with amount of oxygen that is soluted in water that is used in aquacultural plants and usage of food. Infact efficacy of oxygen usage (UE %) and relative oxygen-feed ratio OFR $kgO_2/1kg$ feed are very important parameters and should be taken in consideration in cultivation process, managerial part of the plant. The average values ($M \pm SD$) of this parameter for the growing trouts was 66.23 ± 7.27 % (minimum value in January 56.52% and the maximum value in August 76.83%). CV Value (%) = 10.98. The average value for the pre broodstock e UE was 69.05 ± 7.54 % (minimal value was 54.87% in January and the maximal value was 75.74% in August). The CV value was 10.92. We did not found out a significant difference during the comparison of UE (%) values for both trout groups ($P > 0.05$). The values of OFR that we earned confirms the fluctuation of this parameter from 0.696 to 0.864 kgO_2/kg feed. The results of this study did not prove significant diferences during comparison of average values of UE (%) for both groups of trout that we tested ($P > 0.05$). The average value of oxygen consumption at pre-broodstock group was 4.27% higher than the average value of oxygen consumption at growing up trout.

Key words: rainbow trout, raceways, relative oxygen-feed ratio, efficacy of oxygen usage

SESSION

5

HEALTH AND ENVIRONMENT, LEGAL FRAMEWORK – GIS AND REMOTE SENSING CONTROL



o5–01 – Key speaker

MONITORING RESULTS OF MUNICIPAL SUSTAINABLE URBAN DEVELOPMENT BASED ON GLOBALLY RECOGNIZED INDICATORS (CASE STUDY CENTAR MUNICIPALITY SKOPJE)

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Abstract: Urban development of the Centar Municipality has never been monitored nor evaluated using the parameters and indicators from the international institutions or following accepted procedures. The paper focuses on the critical need to implement the most adequate indicators and introduce the system of performance measurement using one of the 3 offered indicators: SDG from the UN, EU Sustainable development indicators or ISO Standards. Proposed project suggest methodology to include comparative measurements applying most adequate set of indicators and reducing implementation complexity (material and technical). Advanced solutions based on ICT, GIS and mobile applications are recommended as fundamental tools for accurate data collection, interoperability standards definition, integration, analysis, visualization, modeling, reporting and distribution/dissemination. Several topics are included, e.g: typical specifications on City neighborhoods defined with the General Urban Plan of Skopje; relevant data inputs based on surveying citizens expectations and needs; attractive areas for investments based on business interests (mainly in construction business); parameters for sustainable urban development from UN SDG goal 11, ISO and EU indicators for sustainable cities; need of accurate data; possible data sources for parameters measurement; mapping, geo-spatial analysis, existing solutions and applications. Indicators and measurement tend in reducing uncertainty, but not eliminating it completely. In addition, indicators have an important role for assessment of the impact of human activities on the hot topics for our city – protection of the environment, air-quality and all types of pollution. Without real indicators evaluated over time there is no instrument to evaluate the effect and results from the decisions, measures and activities applied.

Key words: sustainable urban development; indicators and SDG – Development goals; integration and analysis

o5-02 – Key speaker

A MODEL APPROACH FOR DEVELOPING URBAN GREEN NETWORK PLAN FOCUSED ON HISTORICAL AND URBAN IDENTITY: A CASE STUDY OF REPUBLICAN PERIOD IN ANKARA PROVINCE

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Abstract: A model approach is adopted that emphasizes history and identity concepts within the green network plan in the example of republican period in Ankara Province. Historical landscape elements are indispensable assessment criteria for green network plans just like the historical traces are quality indicators in the quality of urban design. The green network model approach explained in this paper is based on historical and cultural landscape elements and other defining parameters as well as linear elements that will ensure potential connectivity prioritized with Analytic Hierarchy Process (AHP) and Space Syntax. As a result of applying the method within the framework of the case study, two significant urban axes were revealed as historical and cultural identity elements. Thus it will be possible to provide healthy and safe movement possibility to the users in their daily life with pedestrian and vehicle green network routes on one hand; and to contribute to sustainability of the urban memory with the interaction they will have encountering historical elements on the other. Model presented with the paper proposes to ensure a relational link with the urban space so that a more consistent and sustainable contribution can be made via the green network system.

Key words: urban green network, space syntax, urban identity, GIS, Ankara

GREEN AREA ORGANIZATION APPROACHES IN URBAN PLANNING: KAYSERI CASE, TURKEY

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Abstract: There has been rapid population growth in Turkey in the last century. Increasing population accumulated in cities and especially in metropolitan ones. This period was tried to be controlled with city development plans throughout Republic period but did not prove success except for a few cities. Cities in Turkey today; with their crowd, problems of infrastructure and transportation, with their complex function and polluted air and lack of green field are the outcome of this unsuccessful planning process. Kayseri is at the top of the list among cities which are successfully managed in city planning and application. City development plan was prepared for four times in 20th. Century in Kayseri (1933-1944-1974-1986) and all of them were applied as well. Could development plans which are built positively about urban functions such as housing, trade, industry, transportation and municipal management who puts them into practice succeed similarly in green area organization in 70 years of period? In the paper, green areas of Kayseri metropolitan city which were built with city development plans will be discussed in the basis of this research problem. In the study, four development plans which were prepared in 1933, 1945, 1974, 1986 plan explanation reports will be used as basic data. The method of study is based on periodical comparison of city development plans in the context of active green areas.

Key words: landscape design, landscape planning, urban planning, green area, urban design

URBAN SUSTAINABILITY INDICATORS AND GREEN STRATEGIES IN URBAN PLANNING

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Abstract: Urban sustainability indicators are tools that allow city planners, city managers and policymakers to gauge the socio-economic and environmental impact of infrastructures, policies, waste disposal systems, pollution and access to services by citizens. They allow for the diagnosis of problems and pressures, and thus the identification of areas that would profit from being addressed through good governance and science-based responses. They also allow cities to monitor the success and impact of sustainability interventions. Urban centers are drivers of global warming because they concentrate industries, transportation, households and many of the emitters of greenhouse gases (GHG). Cities are at the center of the climate change challenge. The impact of urbanization on climate is likely to increase given future urban population and economic growth trends. With more than half of the world's population living in urban areas and an increased percentage in the future, urban areas make up the greatest concentration of climate vulnerable people and infrastructure. The methodology approach in this scientific paper focuses on defining the measures for risk management and vulnerability of the urban climate, overcoming urban adaptive capacity aspects and creating urban climate adaptation planning that will be factor for sustainable development in the cities. The expected outcome results in this scientific paper is creating urban climate mitigation and adaptation planning that will focus on the complexity of the cities: energy supply, transport, buildings, energy demand, low-carbon technologies. Effective adaptation and mitigation planning demands clear metrics of success, a protocol to identify and construct policy levers, and tools for enhancing social and ecological capacities. Conceptualizing urban areas as sets of intersecting systems provides the basis to study the structure and organization of urban systems.

Keywords: sustainability, urban adaptation, climate change, sustainable development

ANALYSIS OF THE TREES AND ORNAMENTAL PLANTS USED IN ATATURK SQUARE AND ÇAĞLAYAN PARK IN NICOSIA – CYPRUS

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Abstract: In this study, the transformation of trees and ornamental plants of Çağlayan Park and Sarayönü Square are analysed in historical progress. The historical memory of the city is located within the areas of socialisation, and the squares and parks which have social and historical significance for societal life also reflect this. Sarayönü Square is the oldest centre of Lefkoşa, and its name (in front of the palace) derives from the royal palace built in the square during Lusignan period. It was named as Sarayönü Government House in the British period and changed to Atatürk Square in 1943. The historical processes of the square have led to changes in landscape and arrangement of plants. Çağlayan Park studied here, is one of the oldest and essential parks to date. It is the oldest of the three park projects. The richness in the variety of plants and socially preferred by the inhabitants of the city. In this study, The trees and ornamental trees used, the transformed environment of .landcaping are studied. Nicosia receives 300-400 ml of rainfall annually and has calcareous soil structure since it is located in the Mediterranean climate region . Two surveys carried out in two different locations concluded with the identification of 25 different species of plants in this scope. Among the distinguished plants, the most commonly observed plant species are as follow Eucalyptus, Ficus Benjamina, Morrus Nigra, Acacia Cyanophy, Casuarina Eguisitifolia, Cupressus, and Schinus Molle.

Keywords: Cyprus, Nicosia, Landscape, Atatürk Square, Landscape, Ornamental Plants, City Parks

USE OF NOISE MAPPING TECHNIQUES IN URBAN LANDSCAPE DESIGN

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Abstract: Noise, commonly defined as an unwanted sound, is an environmental problem to which human are exposed throughout their life. The transportation facilities that participate at the road service, the railroad traffic, and the air traffic are important sources of noise and vibrations. The noise and vibrations generated by them are extremely harmful both for travelers and drivers, and for the environment. In contrast to many other environmental problems, noise pollution continues to increase due to the industrial, social and transport development. Noise maps are one of these studies. These maps are a cartographic representation of the noise level distribution in a determined area and period of time. The aim of the study is to determine the traffic noise in Tekirdag- Hükümet Street and to investigate possible solutions to reduce the traffic noise. Noise levels e measured on 15 different points between mornings (8:00–9:00), noon (12:00–13:00) and evening (17:00–18:00) hours and the results will be analyzed statistically and also these values will be entered and analyzed via Geographical Information System (GIS).

Key words: Noise, Urban design, GIS, IDW

o5–07 – oral

PREMISES FOR ESTABLISHING A REGIONAL MOBILITY CENTER FOR THE DANUBE DELTA AREA

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Abstract: In support of the transition to sustainable mobility, a large array of strategic documents concerning sustainable development at European, national and local level set associated objectives to be met through specific instruments such as mobility remodeling projects. 2018 has been labeled by the European Commission as the “Year of Multimodality”, raising awareness on the importance of multimodality – use of different modes of transport on the same journey – for the efficiency of transport solutions. Tools for integrated mobility management will help reduce CO₂ emissions and improve the quality of life of European citizens, contributing towards the Paris Agreement targets. Sustainable mobility solutions are deemed as increasingly relevant for tourism destinations, especially in natural protected areas like the Danube Delta Biosphere Reserve, where environmental pressures from touristic activities need to be mitigated in order to preserve biodiversity and landscape quality. Practices that aim at reducing the socio-ecological impact of visitor movement within the territory include providing visitors with the necessary support for responsible tourism, including comprehensive and up-to-date information on ecotourism alternatives and sustainable mobility options for their trips. The premises for creating a mobility information center for Danube Delta, as a measure for increasing the quality of services provided in the nodes of an international destinations network along the Danube, have been studied in the context of the activities carried out in the Interreg Danube project Transdanube.Pearls. Based on a collection of best practices from comparative case studies across the European Union and an analysis of the state-of-the-art of regional mobility and tourism systems in the Danube Delta area, we conclude that establishing a regional mobility center in Tulcea municipality, in a close partnership with relevant stakeholders, would positively impact the mobility behaviour of both tourists and inhabitants and increase mobility management capacities of local and regional authorities.

Key words: mobility management, mobility behaviour, climate change.

CONTRIBUTION OF ENERGY EFFICIENCY MEASURES TOWARDS REDUCTION OF GHG EMISSION

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Abstract: The activities that are performed on local level contribute towards GHG emission on global level and for this reason it is important to decrease the sources and emission of these gases within the municipality. Additionally, one of the biggest challenges in sustainable functioning of institutions on local level are the high costs for heating/electricity for public buildings and street lighting, mainly due to the previous approach in construction of public buildings and facilities, that was not focused on the environmental aspects and technical standards to optimize the energy efficiency of buildings and public facilities. Within the component of the Nature Conservation Programme in Macedonia for implementation of small projects by the municipalities or local NGOs, one of the priorities was to support projects focused on environmental friendly practices, use of renewable energies and energy saving techniques. In this paper, we have analyzed the results from the implementation of energy efficiency measures and renewable energy use on emission of CO₂ and reduction of costs for heating and electricity (energy savings) in the municipalities from the East Planning Region in Republic of Macedonia, where the supported projects were implemented. The effects from the energy efficiency measures and renewable energy use have major impact on the environment protection and in the same time provide long-term benefits for the local economy.

Key words: energy efficiency, GHG emission, energy saving measures, environment.

ENERGY EFFICIENCY OF MODERN GLASS STRUCTURES

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Abstract: Glass as a construction component in contemporary architecture takes its deserved place providing transparency, space and light in to modern objects. Today's objects envelope consist of 10 to 100 percent glass. Modern glass structures provide not only structural stability of the object, but also provide sound and thermal characteristics suitable for the final use of the object. In this paper, general information of the modern glass components of the glass structures is provided. Also, measurement of the specific characteristics of numerous glass aluminum systems and glass PVC systems are performed. This paper deals with thermal properties of the glass facade of the object, in function of the glass system, aluminum structure and facade design.

Key words: glass facade, thermal transmittance, energy efficiency

ACHIEVING ENERGY EFFICIENCY IN HISTORICAL BUILDINGS

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Abstract: Very recently in the world, global concerns have raised about environmental problems, following the high rates of consumption and production patterns of urban areas including energy consumption. At the core of the discussion energy has major place as energy related emissions represent the two-third of total GHG emissions. In this sense, buildings are recognized as the largest energy consuming structures accounting for over one-third of total final energy consumption. Therefore, achieving energy and emission reduction in the buildings started to be seen as key to sustainability and energy efficiency become key to ensuring a safe, reliable, affordable and sustainable energy system for the future. In this context, achieving energy efficiency in historical buildings is an important challenge. On the one hand, the historic buildings are important building stocks in order to answer some portion of the growing need for new buildings resulted by growing urbanization. On the other hand, they are important in a sense that they have architectural as well as political, social and historical importance. Especially the ones in public use need to be first adapted to energy efficiency conditions, because of being publicly valuable and having an important place in the city memory as a public heritage. In this sense, retrofitting historic buildings through sustainability initiatives is a requirement in order to reduce environmental impacts, and to increase building adaptability, durability, and resiliency of those important heritages. This paper aims at revealing the importance of retrofitting of historic buildings in order to improve their conditions with energy efficiency measurements, focusing on the two important public structures in İstanbul, namely the İstanbul City Hall and İstanbul Drapery Market. It tries to point the importance of adaptation of those historic buildings to energy efficient conditions and to emphasize the unique aspects for retrofit of historic buildings, which must be given special consideration.

Key words: energy efficiency, historic buildings, public heritage.

XERISCAPE ANALYSIS: A CASE STUDY IN A RESIDENTIAL GARDEN IN ISTANBUL

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Abstract: Climate change, the most important problem of the times, threatens humanity. The factors such as increasing world populations, urbanization, technological developments and economic growth have reached to a dangerous point for both the ecological balance and the water resources. Nowadays, the conservation and sustainable usage of water resources should be considered as the most important issue. In this context, it is revealed how important the necessity of developing new landscaping methods in which the water is effectively used in outdoor landscape areas in the cities. Especially, landscape applications in our metropolitan cities, selection of plant species the wide use of exotic trees and shrubs and very large grass areas, which require intensive water use, harm the sustainability and ecological values of the city. The arid landscape (Xeriscape), which is a new concept for our country, has become an important application issue in today's conditions. The main aim of the xeriscape landscape design approach is to protect water resources by minimizing the use of water. Current conditions, in which water is so important, the right landscape design and application begin with a well-done survey analysis which consist of natural and cultural data. A residential garden in Beykoz, Istanbul, has been chosen as a study area. It has been examined the extent of the effective use of water in the landscape application of the home garden based on survey, water use zones, mulch use, grass area detection, drought tolerance of plant species, water consumption amount. In the study, suggestions have been brought forward for efficient use of water especially in house gardens, in terms of contributing to further studies.

Key words: xeriscape lands, loss of load probability, wireless sensor networks, reliability

ENERGY EFFICIENCY IN COMPLEX BUILDINGS – ENVIRONMENTAL BENEFITS

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Abstract: The overall objective of the paper is to analyze the energy efficiency in complex buildings such as hospital buildings and comparison with situation after implementation of energy efficiency and renewable energy measures. For the purpose of analysis, the characteristic building consisting of 16 hospital clinics have been evaluated. The updated European Energy efficiency directive sets the energy efficiency target of 30% by 2030 for the countries which have to set their national policies and action plans to ensure energy savings in all sectors including building and industry sector. The computerized simulation has been made to identify the baseline energy consumption of the hospital complex buildings. The data have been further processed for analysis and comparison of baseline scenario and scenario for energy efficient renovated buildings. The results from analysis show that energy efficient hospital complex buildings may reach operation energy savings up to 50% compared to actual situation where the buildings are operating with inefficient heating and electrical systems. The investments simple payback period is between 5-6 years. Including the renewable energy sources for hot sanitary water, the project will help mitigate the projected shortfalls and it might address issues related to energy security (dependency on the energy imports), by reducing public expenditures on energy and environment impact due to energy use. The results show significant improvements on energy efficiency in complex buildings, resulting with lower heat cost for the buildings, reduction of fossil fuels use and reduction of CO₂ emissions up to 40%.

Key words: Energy efficiency, renewable energy, complex buildings, emission reduction

NUMERICAL INVESTIGATION OF THE EFFECT OF USING NANOFLUID ON PLATE HEAT EXCHANGER PERFORMANCES

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Abstract: Plate heat exchangers, introduced during 1930s to meet the hygienic demands of the food industry are among the most popular heat transfer devices in many engineering and industrial applications because of their compactness, flexibility, easy maintenance, simple use and high thermal efficiency. Intensification of heat transfer process in plate heat exchanger is a result of the turbulence effect in the flow channels due to the complex plate geometry configuration. The performance of the plate heat exchanger is affected by the type of working fluid used. The search for working fluids with better thermal performance led to the invention of innovative heat transfer fluids with suspended nanometer-sized solid particles, called nanofluids. In the present paper, the effect of using Al_2O_3 /water nanofluid on the performance of counter-flow plate heat exchanger is numerically investigated. Nanofluid is considered as a homogeneous mixture with temperature dependent thermophysical properties. Simulations are performed for nanofluid at optimum concentration of Al_2O_3 nanoparticles in the base fluid at which maximum enhancement of heat transfer characteristics is achieved. Validation of the mathematical model by comparing numerically obtained results with experimental data suggests that CFD can be successfully used to predict the plate heat exchanger performance. The CFD results are used for calculating the nanofluid heat transfer characteristics and pressure drop using theoretical correlations. Comparative analysis shows that using nanofluid as a working medium in a plate heat exchanger instead of pure water leads to improvement of heat transfer with a small penalty in pressure drop.

Key words: CFD, energy efficiency, heat transfer, plate heat exchanger, nanofluid, computational fluid dynamics.

LOW – CARBON PRACTICES FOR DECENTRALIZED RESOURCE UTILIZATION AND ADAPTATION TO CLIMATE CHANGES

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Abstract: Introducing a well-founded system for sustainable development in the region and mitigating the effects of climate change through low-carbon practices such as: stopping the burning of storms and preventing large-scale forest fires and atmospheric pollution, creating economically justifiable incentives for recovery of waste biomass for regeneration and improvement of the qualities of the main elements of the environment related to one of the main sectors for the region – agriculture, incl. soils, groundwater, guaranteeing soil fertility for the introduction of high-performing productions in farming, livestock and processing industries. Implementation of municipal low-temperature heating systems with multiplier economic effect – on the one hand reducing the cost of the waste management system to 70% and eliminating the cost of fossil fuels: natural gas, petroleum derivatives, wood pellets, etc. Exemplary solutions for introducing low-carbon practices for decentralized waste recovery are:

- Utilization of biodegradable and construction waste in the construction of green park urban systems.
- Mobile installations for accelerated decentralized composting of biodegradable waste
- Installations for decentralized urban composting systems:
 - Composting of biodegradable hotel waste in a compost reactor
 - Waste recovery system to produce carbon-negative heat energy for heating 1000 square meters of built-up area.
 - Settlement low-carbon waste disposal sites with regeneration practices.
 - Carbon negative practices for flooding forest areas and overcoming the effects of droughts and fires in forestry.
 - Carbon negative practices for the restoration of damaged soils (including burned forest land), soil microflora and soil moisture coating.

The above examples have been developed with technical means and are aimed at demonstrating the so-called integrated low-carbon practices through which soil re-carbonization, soil micro-flora development and restoration of soil moisture retention are guaranteed to ensure soil fertility

Key words: low-carbon practices, re-carbonization, climate changes

ENERGY DEMAND FORECAST FOR AGRICULTURE SECTOR IN TURKEY

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Abstract: Turkey's agricultural share in Gross Domestic Product (GDP) is steadily decreasing. Agriculture sector grew 3,5 percent in 2009 and its share in GDP increased to 10,1 percent from 9,2 percent in 2008. Furthermore, the share of agriculture sector in total employment was recorded 24,7 percent, while it was 23,7 percent in 2008. Agriculture sector share 6,2 percent in 2016. Turkey is a country for importer of energy. Therefore, it is important to determine what Turkey in the agricultural sector so that energy needs. In this study, energy consumed in agriculture from the Ministry of Energy and Natural Resources was used between 1972 and 2015. In the econometric analysis of the study, Energy Trend related Line Trend Model was used. In addition, Granger causality between the agricultural Gross Domestic Product and the Energy Consumed in Agriculture with Fixed Prices has been investigated.

Key words: agriculture, energy, trend model, granger causality.

THE EFFECT OF CLIMATE CHANGE ON FOOD SECURITY OF TURKEY

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Abstract: The aim of this study is to determine the effect of climate change on food security of Turkey. To achieve this aim, the main agricultural products of Turkey were selected as wheat, barley, rye, oats, sugar beet, rice, dried beans, red lentils, green lentils, chickpeas, milk as to area sown, production quantity, economic importance and available data. The taken into the scope of this study data (production, consumption, import, export and price) were collected between 2000-2016 periods from Turkish Statistics Institute (TURKSTAT). In calculating the effect of climate change on yields it was taken as the base year of 2016. Temperature and precipitation projections toward the future General Directorate of Meteorology HadGEM2-ES global model data and RegCM4.3.4. regional climate model data has been compiled for 2020-2050-2080 years. Analysis and evaluations were made at the regional and national levels and the 'Level 1' regional system of the TURKSTAT (12 sub-regions) was used as the regional level. The effect of climate change on product yields was calculated using the Penman-Monteith and Blaney-Cridde formulas. According to research finding, it was estimated that product yields would be decrease in the average 2-7% in 2020, 4-12% in 2050, 5-20% in 2080. The yield and production decreases would make a serious threat with increase of population and per capita income with the climate change on food security of Turkey.

Keywords: Climate change, yield, food security, projections

RURAL AREAS IN SERBIA AND CLIMATE CHANGE – IMPACTS AND POSSIBLE DIRECTIONS FOR ADAPTATION

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Abstract: In Serbia, 75.1% of the territory are rural areas where approximately 49.9% of the total population lives, and average population density is about 62 inh/km². There are 6,158 settlements in Serbia, of which 193 are urban (3.1%) and 5,965 are “other settlements”, which are considered as rural villages and which have rich natural resources. Like in other countries, rural areas in Serbia are underdeveloped and they are one of threats for sustainable regional development. In order to promote their further development and overcome all negative impacts, it is necessary to have multidisciplinary approach and to take into account all possible impacts, among others also climate change. This paper discusses impacts of climate change on rural areas in Serbia and possible measures for adaptation. Both urban and rural areas are facing effects of climate change and one of the main tasks of modern spatial planning is to define a model for revitalization as an instrument for the adaptation of settlements to climate change, and in order to overcome, among other things, existing environmental problems and reduce pollution of the environment. Successful model for adaptation, should be based on vulnerability assessment and should consider both short and long-term impacts in order to make resilient settlements.

Key words: rural areas, climate change, adaptation of settlements, vulnerability assessment.

FEASIBILITY OF AN ECO-ETHICAL SIMULATION IN A CONDITIONALLY REAL WORLD

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Abstract: A fundamental problem regarding the functional interpretation of our subsistence and perseverance has always been existent. Analytical characterization of our real world, in particular with reference to the ethical aspects of environmental protection, has rarely been measured properly, lacking equipment and/or capacity. Thus, the work presented herein is an initial attempt to analytically characterize and compare eco-ethical aspects of the real life versus the world in ancestor artificial simulation and their traits. The feasibility examination of an eco-ethical simulation in the conditionally real world, in this work, is based on the postulates of the simulation argument, while Multi-criteria Analysis (MCA) is utilized as methodological tool. Thus, the focus herein sets on: (1) the attempt to identify the characteristics of both worlds – the presumably real world and the simulated world –, and (2) the observations of ecological and ethical aspects in order to characterize their strain on realizing a conditionally ideal world. Concordantly, in the theory of ancestor artificial simulation the focus shifts on identifying which aspects have already been established; which should additionally be taken into account and finally which should be ejected in order to contribute to the presumably real eco-ethical world. In this work presented are the preliminary outcomes showing whether there are or are not realizations of an ethical simulation versus the eco-ethical presumably real, unideal world. This paper proposes a model for evaluating the reliability of the theories.

Key words: simulation argument, eco-ethical simulation Multi criteria analysis (MCA)

**ACCUMULATION OF SOME TOXIC ELEMENTS
IN RELATION TO ITS MOBILITY IN *CENTAUREA
LEUCOMALLA* BORN. SPECIES FROM
THE VICINITY OF AN AS-SB-TL ABANDONED MINE,
ALLCHAR, KOŽUF MOUNTAIN**

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Abstract: The aim of this work includes the investigation for establishing the accumulation of some toxic elements in relation to its mobility by plant *Centaurea leucomalla* Bornm. found in the areas of the abandoned As-Sb-Tl mine Allchar, Kožuf Mountain. The locality of Allchar has unique mineral composition. This mine is world-famous for its thallium minerals but also known for large amounts of arsenic and antimony minerals. Many plant species have now been found that are capable of accumulating metals in above-ground tissues at concentrations which are significantly high. Investigations have been initiated to determine the levels of uptake and distribution of As, Sb and Tl, as well as some other toxic elements, to the different parts of the species of *Centaurea leucomalla* Bornm., an endemic species from this locality. To assess the level of contamination at this mining area with toxic elements and to determine the level of accumulation of various elements in plant samples of different plant parts and soil were digested and then analysed by ICP-AES. It was found that the accumulation of As, Sb and Tl in this endemic species is significantly high. Total As content in soil ranged from 27 to 7750 mg kg⁻¹, and in the plant from 0.25 to 211 mg kg⁻¹, the content of Sb in soil ranged from 0.71 to 8820 mg kg⁻¹ and in plants from 0.25 to 58 mg kg⁻¹, and the content of Tl in soil ranged from 22 to 1430 mg kg⁻¹ while in the plant from 0.10 to 239 mg kg⁻¹. It was found that the content of As was significantly higher in the roots, leaves and stems, while the content of Tl was signifi-

cantly higher in the roots of *Centaurea leucomalla* specimens. Such behavior of As, Sb and Tl was confirmed by the extraction tests with various solvents of soil samples collected from the same locations as *Centaurea leucomalla* specimens. It was established that in all extraction solution Tl was the most extractable element. Accumulation of these elements in the *Centaurea leucomalla* may cause these plants valuable tools for bioindication, while, from the other hand, the accumulation of these toxic elements in the plant causing risk to human and animal health.

Key words: *Centaurea leucomalla* Bornm., toxic elements, antimony, arsenic, thallium, Allchar, Republic of Macedonia

ORAL SESSION

6

**MANAGEMENT OF URBAN
AND INDUSTRIAL WASTE
AND WASTE WATER**



o6–01 – Key speaker

REGIONAL APPROACH OF WASTE MANAGEMENT IN MACEDONIA

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Abstract. Waste management is one of the biggest environmental problems in Macedonia. The most portion of waste is deposit at the landfills, which is the least favorable option of waste treatment. Furthermore none of the existing landfills do not meet EU and national standards. In 2005 it was adopted National Waste Management Plan, which stipulates regional approach in solving of waste management problems. This is confirmed in National Waste Management Strategy 2010-2020 and in the numbers of laws in the sphere of waste management, but this has not realized yet. It is worth to mention that now there is a big opportunity to start with the implementation of regional approach in waste management. The regional approach covers waste management operation in six regional centers (East, Northeast, Pelagonija, Southwest, Vardar and Skopje). With the financial and technical support of the European Union there are performed four feasibility studies that analyze the waste amount and waste structure and give solutions for establishing regional waste management centers, where should be performed waste selection and waste recycling and other forms of waste recovery. This will enable on an average level, 75 % of waste recycling and waste recovery. Only about 25% of waste will be disposed into the landfill. Also there are preparation activities for other two regional centers. The regional approach of waste management is based on the experiences of the EU. Nowadays the most of preconditions for beginning the realization of establishing the regional waste management centers. But this regional approach has not to stop the activities for primary waste selection and collection. These activities should perform parallel way. The main aim of this paper is to analyze the activities for the regional waste management in the six regions of the country and to give some recommendations for acceleration of this process.

Key words: waste management, standards, regional centers, landfills

INTEGRATED TREATMENT OF BIO-WASTES FOR CIRCULAR ECONOMY

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Abstract: Review on the methods and technologies for integrated treatment of bio-wastes oriented to the utilization and recycling of Carbon and improve energy efficiency are the main subject of presented paper. Recycling of Carbon is essential for Agriculture and soil productivity and it is aa important for Sustainable Carbon Life Cycle. The same time it is well known that all bio-wastes generated have a heat capacity and it is a matter of the method and technology selection to be used efficiently for heat and electricity production. As the results from the practice and investigations have shown the pretreatment drying process could be effective if only cheaper solar energy or heat of waste gases is utilized. In some cases radiation pretreatment is also needed on the way to avoid harmful pathogens and hazardous substances as impurities. On the base of data available and obtained from out investigations it was found that it is essential to obtained final products with water content less than 10wt%. This is the way to avoid bad smell released and to make bio-waste free from pathogen microorganisms. It was confirmed that all products obtained are free from pathogen microorganisms and different weed seeds, affecting the yield and soil sustainability. The processes and optimal conditions determined are recommended for practical use and some of them are recommended as a good and sustainable practice successfully.

Key words: bio-carbon, agricultural and industrial bio-wastes, sludge from bio-treatment waste waters, thermal and radiation treatment technologies

EXPERIMENTS ON BIOLOGICAL TREATMENT AND PROCESS SIMULATION OF A FOOD INDUSTRIAL WASTE

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Abstract: During food processing in general, and of meat industry, in particular, there is great quantity of waste streams representing three material states: solid, liquid and air which are deriving and discharging in air, ground and water streams, rivers, lakes and seas, causing severe environmental contamination impacting negatively to the human health and to prosperity of our society. Actually, from the meat processing plants in Albania are producing a lot of products and sub products deriving from a lot of conventional and modern processes. Although, it has been increased the nomenclature of the product and their quality, there are still many problems with waste discharging and it is needed a strong movement to be applied regarding cleaner production, referring to the best available practices. We have investigated some meat processing plants located mainly in Tirana city, which have a great capacity, discharging a big quantity of waste waters coming from different stages of the technological process flow diagram. Characterization of these wastes, through laboratory analysis and tests using instrumental operations, has shown a fluctuation of the physical properties and chemical ingredients, considering a considerable samples being analyzed from our research group. Modeling and simulation of the biological treatment except laboratory testing and treatment with active sludge taken from the municipal waste water treatment plants of those samples, have been also performed recently using different chemical process commercial simulators, and the results have been comparing with experimental data. Finally, we have proposed an integral flow sheet diagram of a liquid waste discharged from the slaughter and meat treatment with improved parameters.

Key words: food industrial waste, biological treatment

GRAPHENE–COATED COPPER WIRES

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Abstract: Graphene is a promising material with excellent electrical, thermal, mechanical and optical properties. Graphene wires are more electron conductive than copper and silver, with lighter weight, more stable on higher temperatures and good chemical stability. Because it's exceptional properties graphene film layer on copper wires has potential applications in the new computer chips and flexible displays. Tiny coated copper wires with graphene films could faster exchange transport data, increases strength and protection of corrosion. In this work chemical vapor deposition (CVD) of graphene on copper wires using waste plastics, mixture of high density polyethylene (HDPE) and polypropylene (PP), as precursors and copper wires as substrates was studied. Two-stage process was carried out into serial plug flow reactors, pyrex glass tube and quartz tube. In the first stage pyrolysis of waste plastics was conducted in inert atmosphere using Al_2O_3 and opalized silicate – tuff as catalysts. In the second stage the vapor of the waste plastics pyrolysis from the first reactor was the feedstock into the second where the graphene deposition on the copper wires was carried out. Graphene deposition was performed heating copper wires at constant temperature from 800°C to 1000°C. The effect of substrate temperature was studied. Synthesis of graphene layer was analyzed using Raman spectroscopy method. Obtained graphene-coated copper wires were analyzed with standard test methods for analyzing natural and synthetic obtained fibers. The CVD is a promising method for graphene-copper wires production.

Key words: graphene-coated copper wires, chemical vapor deposition, waste plastics, Raman spectroscopy analysis

ESTABLISHING OPTIMAL GLASS PACKAGING WASTE COLLECTION: A CASE STUDY OF CITY OF SKOPJE

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Abstract. Packaging waste recycling produces a number of environmental and economic benefits. It is related with separate waste collection. Waste infrastructure contributes significantly to the sustainable packaging waste recycling, yet not enough. It is also crucial that citizens are willing to do primary selection of their packaging waste and dispose it to the dedicated containers, but also waste collection company has to collect and transport that preselected packaging waste for further processing until finally recycled. In the city of Skopje, after establishing collective waste scheme for packaging waste, the waste infrastructure has been improving permanently, but mainly in packaging waste materials such as plastic, metals and paper/cardboard. Glass as a packaging waste was not object of separate collection until 2016, when first containers and bins for glass selection have been distributed in parts of the city of Skopje. Glass as a packaging is one of the most recyclable materials which can be recycled infinite number of times. But, due to the fact that there is no glass factory in the country since 1990' when the only domestic factory was closed, there has been no interest in glass selection and no glass collection scheme exists at all. On the other hand, although raw material for glass production is rather inexpensive, still reuse of waste glass contributes to the reduction of waste disposal on the landfills and reduction of energy consumption for new glass production. The main goal of this paper is to analyze, research and propose the optimal collection schemes of glass packaging waste collection and recycling in city of Skopje, in attempt to achieve greatest positive environment impact with lowest possible costs.

Key words: glass packaging waste, infrastructure, recycling, separate collection.

TREATMENT OF OILY EMULSION

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Abstract: The separation and treatment of oily emulsion, after mechanical treatment of refinery sludge shall be explained in this paper. The oily emulsions generated in the process of treatment of refinery sludges have complex composition and therefore complex techniques are applied. The chemical composition analysis is approximate due to difficulties in representative sample taking because of the presence of different hydrophobic and hydrophilic components. Methodology applied follows several steps: extraction of the emulsion from the sludge and storing it in a closed tank R-322 physic-chemical stabilization by gravity in a period of one year, treatment of liquid phase into the waste water treatment plant (WWTP) in OKTA by adapting the mechanical and chemical part, upgrading the biological phase with NPK nutrition and introducing additional microbial species, transport of semisolid hydrocarbons from the tank to the open lagoons and possible operations for further recovery/disposal using soil bioremediation with both endogenic microorganisms and plant cultures.

Key words: oily emulsion, refinery sludge, treatment, separation

FUEL CHARACTERIZATION PRODUCED BY CATALYTIC PYROLYSIS OVER Al_2O_3 - SiO_2 MIXTURE

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Abstract: Degradation of the waste plastic materials, by heating in an inert atmosphere is usually done in presence of catalysts. Different type of catalysts, natural and synthetic, can be used for conversion of organic wastes into valuable fuels. The attempt of this paper is providing a basis for optimizing the potential benefit of used catalytic mixture for polymer recycling. The catalytic degradation of waste high density polyethylene (HDPE) and polypropylene (PP) mixture was studied in a semi-batch reactor with heating rate of $10^{\circ}C\ min^{-1}$ up to $550^{\circ}C$. Different ratio of two catalysts, synthetic, alumina oxide (Al_2O_3) and natural, quartz (SiO_2) were used. The influence of catalyst amounts to a liquid yield and product distribution were investigated. Produced liquid fuel was characterized by determination of density, kinematic viscosity, aniline point and index of refraction.

Key words: waste polyolefin, catalytic degradation, liquid yield, physical characteristics

ENVIRONMENTAL ISSUES AND MANAGEMENT OF CONSTRUCTION AND DEMOLITION WASTE IN BULGARIA

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Abstract: Construction and demolition waste (CDW) is one of the most voluminous waste streams generated and therefore solving problems with them is particularly important. Despite the large potential for solving environmental problems from CDW, this is often overlooked during sustainable construction. CDW is heavy makes it the most costly to transport and dispose of. CDW consists of numerous materials, many of which can be reused or recycled. Effectively CDW minimization takes place at the design stage when it is difficult to set criteria and measurable requirements. CDW is generated during execution of a project which is different from a production process to which an environmental management system can be implemented. Bulgaria itself and as part of the EC makes efforts in this field, which are characterized by comprehensiveness, flexibility and capacity to perform. The introduction of new management practices has an understanding but also difficulties that prevent the management of CDW. This study collects data and includes a thorough review of all CDW related scientific papers, official reports and statistics as well as government legislation. It also includes the issues related to sustainable management of CDW in Bulgaria in order to demonstrate the current challenges in this area of environmental protection. The findings of this study will contribute evidences to both academicians and practitioners towards better management of policies for CDW in Bulgaria and abroad.

Key words: construction and demolition waste, environmental problems, management

POSTER SESSION

1

P1.1.

AIR – WATER – SOIL POLLUTION



SPATIAL DISTRIBUTION AND TEMPORAL TREND OF AS, CD, HG AND PB ATMOSPHERIC DEPOSITON IN ALBANIAN MOSS SAMPLES

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Abstract: Moss biomonitoring and Atomic Absorption Spectrometry (AAS) analysis were used to study the deposition of most toxic trace elements (As, Cd, Hg and Pb) in Albania. Moss samples (*Hynum cupressiforme*) were collected at 55 sampling sites that are distributed throughout the country. Moss samples were collected during August and September 2015. As, Cd and Pb were analyzed by using electrothermal atomic absorption spectrometry (ETAAS) at *Institute of Chemistry, Faculty of Science, Sts. Cyril and Methodius University, Skopje, Macedonia*. Cold vapor atomic absorption spectrometry (CVAAS) is used for mercury determination. CVAAS analysis is done in University of Tirana, Faculty of Natural Sciences. Descriptive statistic and Pearson correlation analysis were used for statistical treatment of concentration data. The order of the concentration of the elements were Hg < Cd < As < Pb. The geometric mean concentrations of As represent a higher value than the geometric mean concentration of Europe (2.4 times higher), meanwhile the geometric mean concentrations of Cd and Pb are lower than the geometric mean concentration of Europe (1.27 and 1.8 times lower). The geometric mean of Hg in our country represent the same level with the respective European value. The elements under investigation show high variance (CV% > 75%), except Hg that show a moderate variation, CV = 67%, and high values of skewness and kurtosis by indicating the concentration data are affected by different factors. The median values of 2015 moss survey of Albania were compared with the same study conducted in Macedonia (a neighboring country) and Norway (selected as clean area in Europe). Median values of As, Cd, Hg and Pb of Albania were lower than the respective values of Macedonia and higher than the respective values of Norway.

The differences should be interpreted as different pollution sources of natural and anthropogenic origin. Pearson correlation and Cluster analysis (CA) are used to identify the possible associations of the elements in the mosses. The results of correlation analysis show moderate and significant correlation between As and Cd ($p < 0.005$). For better interpretation of data regarding the assessment of most probable sources of origin, factor analysis (FA) is performed. The contamination factors were calculated for each element as the ratio of median concentration of the element and the respective background level of the elements in a pristine area. It was found that As is associated with the 4th contamination scale, C4, i.e. moderately pollution scale, and Cd and Pb is associated with the 3rd contamination scale, C3, i.e. slightly pollution scale. The comparison of the results with similar surveys from 2010 show similar results for Pb and Cd, but a decline of Hg (about 2.8 times lower) that is mostly linked with wet deposition during 2015 moss survey and dry deposition during 2010 moss survey. The median values of As is increased (1.4 times higher) compare with moss survey 2010. GIS maps of the contamination factors of each element at each sampling site were plotted and spatial distribution of the elements were discussed.

Key words: atmospheric deposition, moss biomonitoring, AAS, CVAAS, toxic metals, correlation analysis

CORRELATION BETWEEN THE DMFT SCORE OF 6 YEAR CHILDREN AND THE CONCENTRATION OF FLUORIDE IN DRINKING WATER FROM THE EASTER REGION OF THE REPUBLIC OF MACEDONIA

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Abstract: The aim of the study was to determine the correlation between the dmft score of 6-years old children and the concentration of fluorine in drinking water. The dmft of 99 children (48 (48,5%) males and 51 (51,5%) females) from settlements (two different cities and eight different villages) in the Eastern region of the Republic of Macedonia, attending 3 primary schools. Ten water samples were taken in the study area to determine their fluoride concentration by electrochemical method using a special ion Analyser (pH/ISE meter-Thermo-Orion) with a F-specific electrode (Thermo Orion Ion Plus Fluoride Electrode) at the Institute of Public Health. The Spearman Correlation was used for statistical analysis. Results: The mean dmft was 5.65, with standard deviation (SD) of 3.68. The maximum concentration of fluorine was determined in drinking water from village Crnik (0.91 ppmF) and the minimum concentration (0.05 ppmF) from the villages Rusinovo, Budinarci, Smojmirovo and Berovo city. The correlation between the value of the dmft score of the children from the Eastern region, and the concentration of fluoride in drinking water was $r = 0.102$ ($p > 0.05$). Conclusion The correlation between the value of the dmft score and the concentration of fluoride in drinking water was positive indicating that by increasing the concentration of fluorine in the water, the value of the dmft score also increases, and vice versa.

Key words: fluoride in drinking water

WATER AND SEDIMENT EXAMINATION FROM THE SALTY LAKE OF TECHIRGHIOI (ROMANIA)

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Abstract: Sampling sediment and water from the salty lake of Techirghiol. The sediment from this lake is used for therapeutic purposes. The lake, as well as the settlement of Techirghiol, is situated in the eastern part of Romania on the shore of the Black Sea, about 9 km to the south of Constanta. The samplings were conducted on 5 microlocations (Figure 1), considering that on every location a water sample was taken from the surface and the bottom (above the sludge), as well as a sediment (sludge) sample from the bottom of the lake's trough. In total, 15 samples were taken: 10 samples of surface water and 5 samples of sediment (sludge).



Figure 1. Sampling microlocations – Techirghiol lake
(source: Google Earth)

Examinations of general physico-chemical, chemical and radiological parameters were conducted. In total, 770 parameters in liquid samples, then 180 in solid samples, as well as additional organic and radiological parameters. During all of the examinations, no parameters were found with a concentration that deviates from the maximum allowed according to both national and international standards. Therefore, its use is not harmful to health.

Key words: water, sediment examination, lake of Techirghiol,

THE ASSESSMENT OF SURFACE WATER QUALITY IN THE LEPENC RIVER BASIN USING WATER QUALITY INDEX (WQI) METHODOLOGY

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Abstract- Surface waters in the River basin Lepenc have been under the influence of a large number of contamination factors of anthropogenic nature over the last two decades. Contaminations from the soil surface easily reach surface waters, modifying water quality. Today there are many methods that are used to classify of surface water quality. This paper aims to demonstrate the state of surface water quality based on the water quality index (WQI). To investigate the WQI in the Lepenc River basin data measured in spring, summer and autumn of 2017. According to WQI, the waters in the Lepenc River basin Nerodime and Lepenc rivers, vary from WQI-36 to WQI-76.

Key words: Surface Water, Water Quality Index, Pond, Quality, Pollutant, Lepenc.

AIR QUALITY MONITORING IN PRISTINA FOR THE YEAR 2016

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Abstract: Environmental pollution in Kosovo in general is not satisfactory, however in rural areas pollution is very small compared to urban areas. Large disturbances exist in urban centers, especially in the capital of Kosovo, in Pristina. The main factors of this contamination are: Industries, Power Plant of KEK, Road Transport, Central Heating Companies. Urban and Industrial Waste Disposal (with different local impact), wood and lignite for home heating (World Bank, 2011). Regarding the regions, the Pristina region is the area with the highest pollution of air quality caused by nearby KEK power plants, other smaller industries, transport, heaters and other individual heating facilities. Also, the large population concentration over the last decade, the development of the economy and infrastructure, has made Kosovo's capital as the largest urban center to be more polluted in Kosovo. Air pollutants do not know the boundaries, as the worst concerns are; Volatile organic compounds (VOCs), CO₂, NO_x, CO, sulfur compounds SO₂, PM₁₀, PM_{2.5} etc. During the research of this paper, we will conduct air quality monitoring in the municipality of Prishtina for 2016, where air quality analyzes will be obtained from IHMK for the period January-December 2016, measuring the following parameters: SO₂, CO, (µg/3), and always referring to the Directive (2008/50 / EC) and the Law on Air Pollution Protection (No. 03/L-160).

Key words: Air, Pollution, CO, NO_x, SO₂, O₃, PM₁₀, PM_{2.5}, MESP, IHMK, WHO

MONITORING UNDERGROUND WATERS IN SOME VILLAGES AROUND THE MINE “TREPÇA” AND THEIR IMPACT ON DRINKING WATER AND HEALTH

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Abstract: Kosovo, for the sake of large natural and underground resources, as a primary factor, a part of its economic development has been oriented towards the development of the mining sector. The greatest exploitation of these resources occurred especially during the 1970s and 1980s, so exploitation technology as well as processing technology were not at the level as it is nowadays. Consequently, many problems have also been inherited in the field of environment. Here, first of all the environmental impact of industrial wastes, industrial plants, mining landfills, chemical landfills and the agriculture sector should be highlighted. The study consists of physico-chemical, bacteriological analysis and determination of heavy metals in underground waters in some villages around the Trepça mine (Stantërg, Zjaqë and Vllahi). Physico-chemical and bacteriological analyzes were carried out at the National Institute of Public Health in Mitrovica, whereas the determination of heavy metals was done at the Mining Laboratory with Flotation "Trepça" in Mitrovica. Qualitative assessment consisted in analyzing key indicators as well as comparing them with drinking water standards according to the Standards of Direc. 98/83 EC, WHO. From the laboratory data it turns out that the water that emanates from these villages is polluted water as a result of high levels of physico-chemical and microbiological parameters, while some villages the main problem is the presence of heavy bacteria and heavy metals. The source in the well near the elementary school in Stantërg village according to analyzes and the results obtained results as drinking water. Based on these results obtained from the physicochemical, microbiological and presence of heavy metals, we analyzed how they affected the health of the surrounding populations.

Key words: mining sector, water resources, physico-chemical, bacteriological, metals and health indicators

COMBINED ELECTROCOAGULATION AND ELECTROOXIDATION PROCESSES FOR REMOVAL OF AMMONIA FROM LEACHATE

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Abstract: The objective of this article was to evaluate the application of combined electrocoagulation and electrochemical oxidation (EC/EO) as electrochemical methods in the treatment of sanitary landfill leachate. Studies were performed with same leachate samples, collected at "Ramici" regional sanitary landfill in Banja Luka, Bosnia and Herzegovina. Different electrode materials and operational variables such as applied current density and electrolysis time were studied on ammonia (NH₃-N) removal. The results obtained demonstrated that electrocoagulation and electrochemical oxidation are effective as combined technologies to treat leachates from sanitary landfills. For 30 minutes treatment, by electrocoagulation with iron electrodes, efficiency of removal NH₃-N was 57,75 %, and after that, for 120 minutes treatment by electrooxidation with boron doped diamond (BDD) anode, efficiency of removal NH₃-N was 93,76 % (total time is 150 minutes) at current density of 25 mA/cm². The efficiency of removal NH₃-N increased with increasing current density in the range of 5 – 25 mA/cm². Depending on the leachate characteristics, electrochemical treatments can be applied as pretreatment or post treatment of another conventional processes.

Key words: sanitary landfill, waste water, boron doped diamond (BDD) anode

THE PRELIMINARY ASSESSMENT OF BIOLOGICAL STATUS OF SHUSHICA RIVER (VLORE) USING BENTHIC MACROINVERTEBRATES

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Abstract: In the last decade, most of the Albanian rivers have been monitored using different biological indicators. According to Water Framework Directive (WFD) (EC 2000) benthic macro invertebrates as part of biological indicator are used as a component suitable for the assessment of flowing water bodies. The Directive presents a framework for integrated river basin management in Europe, in order to achieve good water status. This article provides a preliminary overview about the ecological status of Shushica river, Albania under the monitoring of benthic macro invertebrate during Spring 2017. The recent process of rehabilitation of the national road, parallel with river and the process of human population growth in this region is expected to have a severe impact in watershed and water quality of this area through reduction of microhabitat diversity and its associated biodiversity. In this study we compared water quality results obtained by two biotic index ASPT and SWRC in three different monitoring point from the source of the river to the down part. The water quality according to this indices before rehabilitation of road represents “*very good*” status in the first station and “*good*” status in the two other stations. The expected increase of impact after reconstruction of this road is going to monitor frequently in the future with purpose assessing of the change of its biological status.

Key words: Shushica river, biotic index, ASPT, SWRC, macroinvertebrate, assessment

STUDY OF APPLYING ROMANIAN BENTONITES FOR IMMOBILIZATION OF HEAVY METALS IN A CONTAMINATED SOIL

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Abstract: A green-house experiment was carried out to assess the effects of Romanian bentonites on heavy metals stabilization in a contaminated soil. The mineral materials are from the different Romanian deposits of bentonite (Gurasada, Petresti, Orasul Nou, Căpușu Mare). We studied the behaviour of 7 materials available on Romanian market (3 Na-bentonite, 3 raw bentonite and 1 feed grade bentonite). Two different approaches were used to assess the performance of different bentonites: a chemical approach based on a single extraction by ammonium nitrate solution (1M) and a biological approach based on estimation of metals contents in plant tissues. Experimental data reveals that there are differences between the ability of studied materials to reduce the mobility of heavy metals. The addition of bentonitic products, especially the activated bentonite from Gurasada and Căpușu Mare, resulted in a significant reduction of NH_4NO_3 -extractable metal content. Comparing with control, the addition of Na-bentonite from Gurasada (5%) led to reducing of Cu extractable content with 88,4% and 67,1% for Pb extractable content. All studied materials showed ability to reduce the uptake of heavy metals in plant. The results of this study indicate that the Romanian bentonite are characterized by a great potential to fix the heavy metals in soil reducing the mobility and should be applied especially where there is a need for temporary restricting ecological risk.

Key words: bentonite, metal-contaminated soil, immobilization

POSTER SESSION

1

P1.3.

SUSTAINABLE DEVELOPMENT, RENEWABLE ENERGY RESOURCES AND MANAGEMENT OF NATURAL RESOURCES



HUBBERT'S THEORY APPLIED ON THE WORLD'S AND ON DENMARK'S OIL PRODUCTION

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Abstract: As a finite resource, oil remains to be one of the main energy sources in the world, still playing a crucial role in countries' primary energy consumption. Considering the unpredictable future of production and utilization of this resource, this paper aims to determine the year of the peak oil production in the world, by using Hubbert's theory adapted to the latest available data. Moreover, the same theory is used in determining Denmark's peak oil production while providing a brief insight into the country's carbon dioxide emissions and installed capacities of wind and solar technologies. The results reveal that Denmark's peak oil production was in 2003, while it is expected that the world's peak oil production will be in 2020.

Key words: Hubbert, Denmark, peak oil production, CO₂ emissions, renewable energy sources

DO GENOTOXIC EFFECT OF DIRECT TREATMENT WITH ROUNDUP DIFFERS FROM THAT INDUCED BY TREATMENT WITH PLANT EXTRACT PREVIOUSLY INFLUENCED BY THE HERBICIDE?

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Abstract: Roundup – a commercial formulation of Glyphosate is one of the widely used in agriculture systemic herbicide for non-selective weed control both in Bulgaria and abroad. Some peoples are in occupational contact with the herbicides. On the other side human diet includes plants that could contain residual herbicides. Many contradictory results about cytotoxicity/genotoxicity of Roundup exist. This gave us a reason to formulate the main goal of our study: i) to evaluate the cytotoxic/genotoxic effects of herbicide after direct treatment, and, ii) to assess its effect after treatment with extract from *H. vulgare* previously influenced by the herbicide using human lymphocytes as test-system. Endpoints for genotoxicity such as induction of chromosome aberrations and micronuclei were used. Clear cytotoxic effect was obtained after both direct treatment with herbicide and after treatment with plant extract affected by Roundup. The herbicide showed higher genotoxic activity compared to the untreated control, but the effect was lower than that of direct alkylating agent MNNG. No statistic significant difference was obtained between the values of chromosome aberrations and micronuclei evaluated both after direct treatment and treatment with extract from plants previously affected by the herbicide. The study gives valuable additional information about the potential risk for humans whose daily diet includes plants treated with Roundup.

Key words: Roundup, genotoxicity, test-system, plant extract

EXTENT OF UV-INDUCED DNA DAMAGE IN ANGIOSPERMS PLANT SPECIES AT DIFFERENT ALTITUDES

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Abstract: Our investigations were done (among) on 9 plant species of 7 different families, growing in different habitats on three altitudes in the Rila mountain, namely at 1350 m, 1782 m and 2925 m. Sampling (dates) times were selected to include different weather conditions from June to August 2017. Due to the specificity of the plant objects e.g. thick cell wall, etc. – which is part of the adaptation to the (environment of habitation) habitat we have succeeded in adapting and applying comet analysis on three different species – *Epilobium angustifolium* (fireweed), *Dactylis glomerata* (orchard grass), and *Pedicularis orthantha* (lousewort). DNA of *E. angustifolium* grown on 1350 m. was more susceptible to damage. The amount of migrated DNA in the comet's tail was $38.74 \pm 2.22\%$ compared to that of *D. glomerata* $22.75 \pm 1.08\%$. Both species did not show any increasing of the value of DNA damage at a slightly higher height – 1782 m. For fireweed it was $39.65 \pm 1.23\%$ and for orchard grass – $23.45 \pm 0.49\%$, respectively. Molecular analysis of plants grown at 2925 m. was carried out in *P. orthantha*. Here the level of migrated DNA was $28.33 \pm 1.12\%$, which is comparable to that of species grown at lower altitude. With regard to the formation of micronuclei, grass species were more sensitive than cereals to UV exposure. The genotype plays a more important role than the height difference of the habitats. This implies the development of protective mechanisms by the plant to overcome the stress of DNA damage.

Key words: UV-B radiation; height above mean sea level (AMSL); DNA damage; angiosperm species.

HABITAT MAPPING AS A TOOL FOR THE IMPROVEMENT OF NATURE PROTECTION IN EASTERN CROATIA

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Abstract: Within the implementation of the comprehensive project in the nature protection in the Republic of Croatia, entitled: EU Natura 2000 Integration Project, one of task was to create an updated spatial overview of natural and semi-natural, non-forest terrestrial and inland freshwater habitats at scale 1:25 000. The activities in producing digital habitat map were carried out from May 2014 to December 2016. The habitat map was produced by using aerial photographs in digital format for a delineation of main patterns and habitat classification. It consists of two types of information; polygonal data describe different habitat types with surface > 1,56 ha, while the punctual data show the location of rare, endangered or protected habitats whose area is smaller than 1,56 ha. Habitat identification and classification were done by using the Croatian National Habitat Classification. In the area of eastern Croatia, a field validation of habitats identified by photo interpretation was carried out from June to August 2015 and from May to August 2016. Total 5,032 field points were collected by using tablet with a GIS/GPS and Habitat Mapper application. The correctly delineated and described habitat types had been validated on-site, whereas oversights were corrected, so the new habitat map would match the reality as accurately as possible. An overview of field survey and distribution of the main habitat type classes in eastern Croatia is given. In addition, the endangered and rare habitat types, protected within the Natura 2000 sites, are presented. An updated habitat map of Croatia is an important tool in planning measures for maintaining a favourable conservation status of habitat types in eastern Croatia, in spatial planning and environmental protection, and in sustainable management with natural resources in agriculture, forestry, hunting and fisheries.

Key words: habitat, map, nature protection, Croatia

SULPHATE PHASES IN THE STRUCTURE OF CEMENT-BASED MORTARS WITH MARBLE WASTE FILLERS

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Abstract: Modern trends in the development of building materials are creating materials with low environmental footprint and lower energy costs for their production. These requirements lead to the development of technologies for the production of new building materials where part of the expensive components are replaced by recycled and waste building materials, inert natural minerals and less toxic technogenic products such as cement substitutes to achieve ecological cleanliness and energy efficiency. In response to current trends in building materials development, the present work explores cement compositions based on white cement and inorganic fillers. White decorative mortars and concretes have restrictions on: white color of the binder and mineral additive, good workability, and a dense structure that does not have significant destructive processes at various atmospheric impacts. In this research are investigated the phase-formation of different cement composites with high content of inert mineral fillers (marble and quartz sand) and different water-cement ratio, obtained after hydration of White Portland cement. The research is made after 28 and 120 days of water curing. The phase composition (new formed phases as well as formation of C-S-H gels, containing SO_4^{2-} , CO_3^{2-} , OH^-) are defined using X-Ray powder diffraction, Infra-Red Spectroscopy

and thermal analysis (TG-DTG-DTA) with analysis of evolving gases with mass-spectrometer. The experimental data show that the cement composites with higher water content exhibit variety of new-formed phases, like hydration products of C-S-H type. The use of marble as addition leads to creation of carbo-sulpho- aluminates.

Acknowledgments: Authors gratefully acknowledge the financial support of the Department of Natural Sciences and Laboratories of Chemistry and Gemology of New Bulgarian University.

Keywords: White Portland cement, marble, C-S-H gels, carbo-sulpho- aluminates

ALGOLOGICAL ANALYSIS OF RIVER SEMETISHT (PEQAN, THERANDË) DURING SUMMER SEASON 2015

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Abstract: During the season when the research was conducted, are determined 71 species. Determined species belong to four divisions: Bacillariophyta with 48 species (67.6%), Cyanophyta 14 species (19.7%), Euglenophyta 5 species (7.04%) and Chlorophyta with 4 species (5.6%). Based on these data we can see that the largest number of species in this algae community consists of Bacillariophyta algae with 48 species or (67.6%).

Key words: algocenosis, river, Semetisht, summer, Kosovo

ADAPTATION OF THE INDUSTRIAL DESIGN THINKING PROCESS TO THE DEMANDS OF BIODEGRADABLE PLASTICS

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Abstract: A variety of definitions for Industrial Design (ID) were developed according the industrial evolution through time. However, it is hard to decide on the definition that suits best for this considerably new research field since it actually is manifested through a type of process. In this view, many common methods are proposed in the related literature that companies or designers use in the product development. Hence, the remarkable development of technology and tools affects the phases in the ID processes and therefore they can be revolutionary game changers. In order to facilitate transforming the ID decision making process into a real eco-friendly product, the environmental factor is used as a focal point. Moreover, for more precise research, biodegradable materials are used as a problem statement. In addition, the aim of this research is to propose a scheme which categorizes the ID phases according the needs of biodegradable materials when designing for environment. In this approach, the ID process includes also the phases such as: end-of-life analysis of the proposed materials, scenarios that occur according this analysis, concepts that fulfill technical and aesthetic requirements, and production and evaluation of prototypes given the environmental, economic and social criteria. The aim of the proposed scheme corresponding to the decision making process is to provide a new method as a facilitative guide for environmentally oriented ID thinking process.

Key words: industrial design (ID) process, design thinking, decision making, environmental design, biodegradable materials

THERMOCHEMICAL STUDIES ON DIFFERENT FUELS AND BIO-WASTES

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Abstract: Fuels supply and their quality is considered as the main topic for coming innovations and industrial sustainable development. There are a number of studies how to make the use of fuels mor efficient. The main subject of this paper is to study the content of some treated fuels mixture and to assess their heat capacity under different conditions on the way to be recommended better use in the practice. LINSEIS thermo-gravimetric differential (TG-DTA) and scan calorimetry analysis (DSC) equipment was used on the way to assess their heat capacity for sustainable use of Carbon, Hydrogen and Sulfur from fuel mixtures of coal, oil and water under different gas media. Mass changes and residue obtained were also determined. The content of Carbon, Hydrogen, Sulfur and Nitrogen were determined using automated Euro 3000 analyzer. Two samples NV-RQ-1 and NV-RQ-2 mixtures of coal and oil were used during studies. It was found that the content of Carbon in sample NV-RQ-1 is 82.92%wt, when in the sample NV-RQ-2 – it is 88.24%wt; the content of Hydrogen is respectively 10.07 and 10.15%wt; Sulfur is 0.1%wt and Nitrogen – 0.85 and 1.07%wt. TG-DTA curves confirm that the main mass loses are generated in Nitrogen media up to 493°C are 88.-89%wt, when in the air-medium the main loses are up to 406°C and they are 84.8%wt. At final temperatures (about 139°C the mass losses are 89-91.6%wt. The main differences are in the thermal stability – in Nitrogen atmosphere the residue is in liquid form and it is between 8.4-9.3%wt. In the air-medium the residue mass is about 12.5%wt and is in a solid form. The enthalpy is much higher for the sample NV-RQ-1 in Nitrogen atmosphere – 32.5 MJ/kg, when for the second sample it only 12.5 MJ/kg. On the base the pretreatment applied for sample NV-RQ-1 is recommended.

Key words: fuels, bio-carbon, TG-DTA-DSC studies, enthalpy and thermal stability

STRY SECTOR UTILIZING LOW TEMPERATURE WASTE HEAT RECOVERY

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Abstract: The energy efficiency in the industry sector is a strong and leading factor for the competitiveness on the domestic and foreign markets. In this paper are analyzed the possibilities for improving energy efficiency in the industry sector by utilizing low temperature waste heat recovery (LTWHR). As a waste heat it is considered the energy that is generated in industrial processes without being put to practical use. The focus in the analysis is placed on the Organic Rankine Cycle technology for utilizing LTWHR as a competitive technology for the energy sources where neither gas nor steam cycles offer a technically and/or economically viable solution to generate electric power or other useful energy transformation. Also it is given brief overview of the cycle configurations that are commonly used or proposed in the literature for this kind of applications. Within the analysis are covered waste heat recovery from the exhaust gases from hot water boilers, steam boilers and combined heat and power units.

Key words: waste energy, heat recovery, energy efficiency, organic rankine cycle,

INVESTIGATION OF WASTE FROM THE PROCESSING OF LIMESTONE FROM VRATSA AREA

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Abstract: Limestone is one of the most widely used rock in the construction. Besides natural limestone, limestone is used for industrial production of lime, carbon dioxide, calcined soda. It is added in the production of cast iron from oily ores. All of this leads to high yield and subsequent processing, which in turn invariably leads to large quantities of CaCO₃-based waste. Another environmental problem worldwide is acidic soils that lose their fertile properties as a result of this type of pollution. The mixing of calcium carbonate, with different types of waste, such as green lye sludge, ash wood or other types of biomass, gives prerequisites that acid soil improvers are obtained. A basic method for regulating acidic soil reaction, which adversely affects the growth and development of plants, is liming (calcium fertilization). It is based on the percentage of the calcium in the soil and the needs of the crops. The choice of a suitable long-term solution for treatment of limestone waste should be based not only on the technical capabilities of the methods but also on all other relevant economic, environmental and social aspects. From the studies conducted, it has been found that achieving sufficient tablet compressive strength can be achieved over a wide range of initial moisture variation, allowing for a different ratio between the components used. The wood ash is well mixed with the waste varnish and has the qualities of enhancers and this is a good prerequisite for their use in mixtures. In this way, the enhancers obtained will be able to be adapted and applied with high agrochemical efficiency to different soils and crops. In the mixtures used, the initial moisture content ranges from 14.6 to 16.7% and granules with static strength in the various mixtures of 1.5 to 6.5 kg / granule. These strengths

are sufficient to meet the standard requirements for commonly used mineral fertilizers. The best mixture can be considered a mixture of 15% in limestone to biomass ash ratio of 85% to 15%. However, other mixtures may be used as intended.

Key words: soil improvers, calcium fertilization, utilize waste

INFLUENCE OF DIFFERENT AMIDE-BASED DEEP EUTECTIC SOLVENTS IN CAO-CATALYZED ETHANOLYSIS OF EXPIRED SUNFLOWER OIL

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Abstract: Among heterogeneous catalysts, CaO possesses many desirable properties for the ethanolysis of sunflower oil [1]. In addition, deep eutectic solvents (DESs) have gained tremendous attention as cosolvents for biodiesel synthesis since these mixtures are cheap, less toxic, biodegradable and easy to be prepared from available and inexpensive precursors [2]. In this paper three choline chloride (ChCl)-based deep eutectic solvents with different amides-based hydrogen bond donors (urea, thiourea, and 1,3-dimethylurea) in the 1:2 molar ratio were prepared and individually tested as cosolvents in the ethanolysis of expired sunflower oil catalyzed by either calcined or non-calcined CaO. All tested DESs promoted the ethanolysis by a successful activation of non-calcined CaO. Among them, the DES with urea gave better results than DESs with thiourea and 1,3-dimethylurea. After five reuses without any additional treatment, non-calcined CaO activated by the ChCl:urea (ChCl:U) yielded fatty acid ethyl esters (FAEEs) content of 85.5% after 2 h, higher than the ChCl:1,3-dimethylurea (ChCl:DMU) and ChCl:thiourea (ChCl:TU). The phase separation of the reaction mixture was the fastest in the presence of the ChCl:U DES. Since ChCl:U DES is non-toxic, biodegradable, bio-renewable and “green” solvent and provides the elimination of the calcination step of CaO, thus reducing the overall process costs, this catalytic system is suggested for further optimization.

Acknowledgment: This paper has been funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia (Project III 45001).

Key words: sensor electricity consumption, loss of load probability.

BUILDING UP ENVIRONMENTAL POLICY INTEGRATION (EPI) FRAMEWORK

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Abstract: Environmental policy integration (EPI) refers to incorporation of environmental concerns in sectoral policies outside the conventional environmental policy domain, e.g. renewable energy (RE) policy. Institutional specialization of policies for specific sectors has resulted in a lack of consideration of environmental impacts. Sectoral policies' might have objectives in conflict with environmental objectives. Ideally, the performance of EPI strategies is evaluated in terms of physical indicators: environmental quality, CO₂ emissions, reduction of climate risks etc. Since this is difficult, reported levels of EPI usually relate to policy processes and output only e.g. the extent to which environmental concerns are considered in decision-making, and in qualitative terms. Further analysis could contribute to more effective EPI strategies by development of a framework on the governance of EPI. In this paper is proposed model built around four dimensions of integration: policy frame, subsystem involvement, policy goals, and policy instruments. For each of these dimensions described are different manifestations that are associated with lesser or more advanced degrees of EPI within a governance system and whether lesser or more advanced degrees of EPI influence investors to invest in renewable energy technologies (RET). In addition, the framework holds decision-makers liable for attempts they make to enhance EPI.

Key words: Environmental policy integration (EPI), renewable energy (RE) policy, renewable energy technologies (RET), governance of integration, dimensions of integration, integration processes

RENEWABLE ENERGY AND ECONOMIC DEVELOPMENT “DISTANCES” IN EASTERN EUROPE

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Abstract: Historically, economic development has been strongly correlated with increasing energy use and growth of greenhouse gas emissions. Renewable energy can help decouple that correlation, contributing to sustainable development. In addition, renewable energy offers the opportunity to improve access to modern energy services for the poorest members of society and to provide energy free of air pollutants and greenhouse gasses by emitting zero or nearly zero percent of these gasses. For EU countries in the context of 2030 Framework for climate and energy, the targets and policy objectives are very clear concerning the renewable energy and for eastern EU countries represent a real challenges if it is considered their economic development. For this study, were selected 8 EU countries located in the Eastern Europe region: Romania, Hungary, Bulgaria, Czech Republic, Slovakia, Croatia, Slovenia and Poland, former communist countries, with different stages of development. The specific data for the selected indicators cover the period 2005-2016. Using multidimensional scaling data reduction method and cluster analysis, the paper provide useful insights concerning first of all the status of eastern European countries and the “distance” between countries indicators concerning the renewable energy and economic development. Also a detailed analysis on the impact of economic development on the renewable energy by country is conducted in order to contribute to the enrichment of the research field.

Key words: renewable energy, economic development, eastern European countries

STUDY REGARDING THE POTENTIAL OF WINE BUSINESSES AND TOURISM TO CONTRIBUTE TO SUSTAINABLE DEVELOPMENT IN ALBA COUNTY

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Abstract: Today, most destinations aim at sustainable development and struggle to encourage the establishment of sustainable businesses. As recent studies reveal, Romania fails to perform well in this respect. The solution to this problem can be related to cultural tourism development. Alba County is a great example of a destination located in Transylvania. It enjoys the presence of attractions listed among the country's most valuable tourist resources but it also faces the challenges of sustainable development as its economy has shifted over the past nearly 30 years from an industrialized-polluting one to a service-based tourism-related economy. As part of a destination's cultural offer gastronomic and wine tourism are world-wide associated to an increased potential of sustainable development both in terms of wine businesses and of their capitalization in tourism activities. Alba County hosts some of Transylvania's most notorious and valuable vineries. The Târnave Plateau, also known as Weinland or the Land of the Wines is located in the heart of Transylvania. It concentrates four of the five vineyards of the region (Aiud, Alba Iulia, Sebeş-Apold, and Târnave). Supported by Jidvei (one of the most important players on the Romanian wine market), the County Council of Alba included in 2016 a number of 18 towns (5) and villages (13) in the national Wine Road program (Aiud, Alba Iulia, Blaj, Câlnic, Cetatea de Baltă, Crăciunelu de Jos, Cricău, Galda de Jos, Gârbova, Ighiu, Jidvei, Mihalţ, Sâncel, Sebeş, Sântimbru, Şona, Teiuş, and Valea Lungă). Rural and cultural tourism have increased significantly in Alba County given many investments and the adoption of coherent strategies. In this context, survey-based research has been carried out on a representative sample of Romanian wine and wine tourism consumers to determine the attractiveness of this type of tourism and its potential for the development of sustainable wine businesses in the area. The research method consists of a self-applied online survey-based research, completing previous desk-

based and field-research based cases studies developed for qualitative primary data collection and of secondary data analyses concerning the destination's supply in terms of wine businesses and wine tourism development. The obtained results are compared to similar international studies. The paper's most important contribution is the provision of solutions for the further development of Alba County's sustainable wine businesses development and the perspectives of wine tourism in this area.

Key words: sustainability; tourism; gastronomy; wine route/wine road; demand; supply; survey-based research; Alba County; Transylvania

POSTER SESSION

1

P1.4.

**AGRICULTURE, FORESTRY,
AGROECOLOGY,
FOOD QUALITY SAFETY**

THE EFFECT OF ORGANIC AMENDMENTS ON UPTAKE ON HEAVY METALS IN MISCANTHUS (*MISCANTHUS* × *GIGANTEUS*)

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Abstract: The effects of organic soil amendments (compost and vermicompost) on uptake of heavy metals in miscanthus (*Miscanthus* × *giganteus*) were studied. Experiments have been implemented in controlled conditions. The soil used in this experiment was sampled from the vicinity of the area contaminated by the Non-Ferrous-Metal Works (MFMW) near Plovdiv, Bulgaria. The soils were amended or not with 5, 10, 15 or 30% of compost and vermicompost. Heavy metal contents in roots, stems, and leaves of miscanthus were analysed. The application of soil amendments favours plant growth and development. Compost and vermicompost application led to effective immobilization of Pb, Zn, and Cd mobile forms in soil. Compost and vermicompost treatments were effective organic amendments and reduced heavy metals in the leaves of miscanthus, but the effect differed among them. Also, there was a dose effect for amendments. The 10% compost and 15% vermicompost treatments led to the maximal reduction of heavy metals in miscanthus biomass. Miscanthus biomass harvested from heavy metals contaminated soil may be used for energy production. The possibility of further industrial processing will make miscanthus an economically interesting crops for farmers of phytoremediation technology.

Acknowledgements: The authors gratefully acknowledge the financial support by the Bulgarian National Science Fund (Project DFNI H04/9).

Key words: miscanthus, heavy metals, organic amendments, polluted soils, phytoremediation.

ASSESSMENT OF CARBON STOCK IN THE SOIL OF THE NEAMȚU WATERSHEAD

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Abstract: The quantification of soil organic carbon (SOC) stocks and its spatial extent is directly influenced by the land cover. The aim of the study is to quantify both the spatial distribution of soil organic carbon and stocks under different soil types and land uses in an area of 41.808,04 ha in northeastern part of Romania. Predominant soils are Cambisols, Fluvisols, Phaezems, and Luvisols, forest being the predominant land use. The transition from forest biomass to herbaceous biomass or crops it means a considerable reduction of the organic carbon. Other important changes are occurring in soil through the transformation of forest humus in grassland humus and cropland. The most important loss of soil organic carbon occurs as a result of changes in the supply of biomass supplying litter and therefore the process of bioaccumulation. The samples were collected from 100 representative soil profiles and analyzed with Analytik Jena multi N/C 2100 with HT 1300 solid module. In order to model soil organic carbon concentrations, it was used the kriging regression technique at different sampling densities for each depth to 100 cm. It is noticeable that soil organic carbon had a positive correlation with different types of land uses and a negative correlation with the elevation, being a decreasing trend of the carbon stocks sequestered in biomass, litter and soil.

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Key words: land cover, kriging regression, SOC spatial distribution

TIMELESS FISHERY COMPOSITION AND PRODUCTION OF KAVALA'S COASTAL WETLANDS (VASOVA, ERATINO, AGIASMA & KERAMOTI – NORTHERN GREECE), AIMING TO THEIR SUSTAINABLE MANAGEMENT

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Abstract: The coastal wetlands Vasova, Eratino, Agiasma and Keramoti, are situating in northern Greece, in the regional district of Kavala, west of the river Nestos estuarine, and about 25km far from Kavala's city. The water area of the above wetlands (lagoons) varying from 15Ha (Keramoti) to 43Ha (Agiasma). There is no water communication between them while each one connecting separately with the sea throw a narrow water channel. Fishery takes place mainly throw suitable stable fish traps, which are locating in the area of the connecting channel with the sea. The fishery management is carried out from a local Fishery Cooperation named 'Agricultural and Fishery Cooperation of Kavala's Fish Farms'. In this paper fishery production data elaborated for the last 35 years (1982-2016). Total fishery production for each one of the four lagoons and the partial production of each fish species were presented in timeline charts and separated in decades and lustrums, with a calculation of mean production, for each time period. The composition of the fishery production was presented also through decades and lustrums as percentage of the total fishery production. The mean annual fishery production of the dominant catch for all the above lagoons which is fish species of Mugilidae family were 23.271kg, becoming 72% in the total fishery composition for the all examined period (1982-2016), while the Sea bass (*Dicentrarchus labrax*) were 7%, the Sea bream (*Sparus aurata*) 9%, the eels (*Anguilla anguilla*) 3% and some other various species only the 9%. The results of this paper can be leveraged within a broader sustainable fishery program, aiming to the environmental friendly management of the coastal lakes of the area.

Key words: Kavala's lagoons, Vasova, Eratino, Agiasma, Keramoti, fishery production, fishery composition, fishery management

THE IMPACT OF THE EUROPEAN FUNDS FOR AGRICULTURE AT THE LEVEL OF THE ROMANIAN ECONOMY

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Abstract: The debate will focus on the absorption of the European funds from Romanian agriculture presenting statistical information offered by A.F.I.R (Rural Investment Financing Agency). Also the presentation will contain important economical details about the development of agriculture in Romania. The analysis will emphasize in a comparative manner the similarities and the differences found inside the country and in the other countries from the European Union. Through AFIR more than 36 000 agricultural projects have been funded until now. Official statistical dates and relevant economical sources will be consulted in order to create a unique presentation regarding such opportunities in the Romanian economy.

Key words: European fund, Romanian economy, agriculture, investments.

OCCURRENCE OF PESTICIDES IN AGRICULTURAL FIELDS AND ORCHARDS

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Abstract: Pesticide use is necessary by the need to assure food and fodder quantity and quality. Even if pesticides are applied according to regulations, they can be harmful to non-target organisms, and have unwanted adverse effects on human health and environment. This study provides information about the presence of pesticides in soil samples collected from agricultural fields and orchards located in Prahova county. The method used for identification and determination of these compounds was gas chromatography coupled with mass spectrometer detector. Despite the fact that they have been banned for over 30 years, organochlorine insecticides, such as HCHs (hexachlorocyclohexane) and DDTs (dichlorodiphenyltrichloroethane) were present in almost all analyzed samples. The total concentration of HCH ranged from 0.008 mg/kg to 0.055 mg/kg in agricultural lands and from 0.012 mg/kg to 0.039 mg/kg in orchards. The total concentration of DDT ranged from 0.022 mg/kg to 0.168 mg/kg in agricultural land, and from 0.018 mg/kg to 0.086 mg/kg in orchards. The ratio DDE/DDT indicate a recent use of technical DDT in almost 10% from analyzed soil samples. In addition with organochlorine insecticides contamination, some soil samples collected from agricultural fields were contaminated with atrazine, while tebuconazole and penconazole were found in soils collected from walnut and apple orchards.

Keywords: pesticides, soil, orchard, agricultural fields

KOSOVO STRATEGY FOR DETECTING THE CERTAIN SUBSTANCES RESIDUES IN LIVE ANIMALS AND ANIMAL PRODUCTS

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Abstract: The certain substances under the considerations of this topic are some unauthorized and prohibited substances having a hormonal and thyrostatic action and β -Agonists effects. According major studies on risks assessment the use of this substances or any way of administration may cause serious consequences, through consumption by humans of the foodstuffs from animal origine. Risks occurs because administered substances in live animals remains like residues in animal tissue. The using of these substances is for purpose of cultivation in various manure with the particular aim to improve the weight gain and feed efficiency. In line of obligations such in the European Community for residues, Kosovo has planned its monitoring strategy to detect the residues. The legislation determined rules of residues monitoring as follows: *Directive 96/23/EC* and *Instruction 26/2005/RKS*. The Group A1 contain the 6 (six) concerned substances. Another important act is *Directive 96/22/EC* & *Instruction 07/2016/RKS*, and the interested matrix were bovine live animals blood and urine matrix in one hand, and another one meat and offals in foodstuffs products. Developing strategies and analytical methods to monitored the illegal substances is the main task for consumer protection, because the Competent Authority after suspicious results for non compliance, they could take all annesary measures. Kosovo planed strategy from 2006 year which is ongoing, improved the efficiency of official checks, capacity development of National Referent Laboratory. Number of planed samples were 900 (Group A1) between 2006-2017 years.

Key words: Animal, Directive, Foodsuffs, Laboratory, Strategy

THE EFFECTS OF AGRICULTURAL IRRIGATIONS: THE CASE OF TURKEY

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Abstract: In this study, we examined the Asartepo dam in Ankara province. We evaluated the economic and social effects of agricultural irrigation. Selected different variables are observed as follows: agricultural usage of water, agricultural production, agricultural productivity, income and environment effects, social-cultural design, migration, economical conditions and etc. Production data of agricultural enterprises for 2015 and 2016 was collected by questionnaire. Agricultural establishments are selected by Simple Random Sampling (SRS) method. Agricultural establishments dealing with irrigation are divided into 2 groups and these are the same. One of them is belong to pre-irrigation group and the other group is belong to after-irrigation group. Pre-irrigation group is stratified into 2 strata and after-irrigation group is stratified into 2 strata according to the planting fields of products. According to the SRS method, sample size is 42. After determining the sample size, this sample is distributed by the method of proportionate distribution. Numbers of the first layer is 31, second layer is 11. The information of the questionnaire data is entried by MS Office environment. During the data analysis is used with SPSS package program. Discriminant statistical analysis will be used for comparing between pre-irrigation group and after-irrigation group.

Key words: irrigation, economic and social effects, discriminant analysis

MULTICRITERIA ANALYSIS ON FOREST POLICY IN THE EUROPEAN UNION

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Abstract: The role of Forest Policy has gained importance today, because of the global issues of climate change and economic crisis. In the European Union, the Forest Policy of each member state is based on its Constitution, the legislation framework and the special aspects of each country. The aim of this paper is to examine the performance of Forest Policy in the member states of the European Union. The methodology used was the multiple criteria decision analysis and more specifically the PROMETHEE method. The data used were retrieved by Eurostat. Twenty six countries were examined as to the implementation of Forest Policy and their efficiency was evaluated according to their productivity as the ratio between output and input. The forest area of each country was used as input and the following criteria were taken into consideration as outputs: 1) the contribution of forest to the economy in monetary units, 2) the protected forest areas and 3) the employed persons in the forestry sector. The criteria cover all three sustainability pillars, namely: economic growth, environmental protection and social equity. According to the findings, Greece is in the last place among all other member states of the European Union regarding the effectiveness of its Forest Policy. Cyprus is in the second place from the bottom, while there were no data available for two countries of the EU, Malta and Luxemburg. The most effective implementation of Forest Policy takes place in the Czech Republic, followed by Slovakia and Germany. The Netherlands, Hungary and Denmark are also examples of countries with effective Forest Policy. The aforementioned countries have a long tradition in the forestry sector and can be used as examples of good practices by the countries of the European South, which achieve low efficiency in the Forest Policy implementation, with the exception of Italy. The forests in the countries of Southern Europe are heavily affected by the economic crisis and climate change, factors that should be taken into consideration in the implementation of Forest Policy.

Key words: Forest Policy, PROMETHEE, European Union, climate change, economic crisis.

CONVENTIONAL AND ORGANIC PRODUCTION ON QUALITY OF CHICHEN MEAT

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Abstract: The poultry industry provides the meat and eggs for urban population in Romania. The poultry meat average annual consumption of some 20 kg per capita and represent second most popular type of meat (the first one is pork meat 29 kg/capita/year). Consumers believe that quality of organic production foods is superior to conventional production foods. The aim of this study was to compare the chemical quality of chicken meat from organic and conventional production: a case study in Bucharest. The quantifiable properties of meat such as moisture, ash, total fats and Pb(II) and Cd(II) concentration are indispensable for processors involved in manufacture of chicken meat.

Key words: quality of chicken meat, organic production, conventional production

ENVIRONMENTAL IMPACT ASSESSMENT FOR USE IN SEEDBED PROCESSING A VIBRO-COMBINATORS SOIL TILLAGE

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Abstract: Nowadays, humanity is facing a major controversy over the choice of appropriate technology of soil tillage. It is the time that is required an intelligence choice between conventional technologies (classical) for seedbed preparation, assuming an intense mechanical processing of soil, which affects soil structure and soil organic matter, and the conservative tillage technologies for seedbed preparation, which removes these disadvantages in terms of an accepted decrease of the production. Seedbed preparation for crop establishment (sowing) is one of the most important agricultural works, as is done with high energy consumption and high costs. The quality of this work influences in large measure the germination of crop and the productivity that can be obtained per hectare. Therefore, at present, there is different equipment from the ones found in classical cultivation technologies, which in single pass can achieve tillage with minimum energy consumption, thus creating optimal conditions for sowing and for obtaining higher yield without soil degradation. These devices are called combinator. Of all the existing combinator, most performant are the vibro-combinators. The advantages of using vibro-combinators are: required preparation of seedbed in difficult working conditions and preservation of moisture and total porosity and reducing of soil compression degree. Such important factors can ensure fast, uniform and early germination of seeds, these requirements standing at the basis of abundant harvests. Advanced methods of statistical analysis (univariate three-way ANOVA and multivariate analysis, PCA, Manova and HCA) began to be successfully used in recent years for the study of soil behavior

at the interaction with the working bodies. In order to carry out the research, we settled in six parcels in the plains of the West of Romania so that we could have three different types of soils which are representative for that specific area. From each profile was collected soil samples in three steps of 6, 12 and 18 cm. For each sample were performed six repetitions (N = 6). We started by measuring the particle size distribution (granulometric composition) and the main physical properties of the soil (moisture, bulk density, total porosity and soil compression degree).

Key words: Vibro-combinator, soil tillage, bulk density, total porosity, compression degree.

POSTER SESSION

2.

P2.2

RISK ASSESSMENT



ASSESSMENT OF FIRE AND EXPLOSION EFFECTS DUE TO TERRORIST ATTACKS ON FREIGHT TRAINS TRANSPORTING LIQUEFIED PETROLEUM GAS

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Abstract: This paper attempts to highlight the fact that tanks containing hazardous materials are potential targets of terrorist attacks. The risk of a chemical accident due to a terrorist attack is higher during the transport of hazardous materials, especially if the materials are transported through inhabited areas. The paper presents a case study of a potential accident during rail transport of liquefied petroleum gas (LPG), caused by a terrorist attack. The study uses the City of Niš in Serbia because a railroad used for LPG transport passes through the inner city. The ALOHA software was used for the simulation, which was conducted for mean annual ambient conditions as well as for each of the 365 days in 2015. The simulation revealed that an explosion of an 80 m³ tank car transporting LPG could threaten the lives of about 6,000 people.

Key words: fire, explosion, terrorism, LPG, rail transport

PROBABILISTIC SEISMIC HAZARD ASSESSMENT IN THE BLAGOEVGRAD – BANSKO – G. DELCHEV IN THE SOUTHWEST BULGARIA

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Abstract: The territory of Bulgaria is a part of the Alpine-Himalayan seismic belt, which is characterized by a high degree of seismic activity. The world statistical data show an increase in earthquake damage over the last decades. This is explained by three main factors. The first one is related to the availability of human and material resources in the high earthquake areas. The second factor is the underestimation of real earthquake, which leads to neglect and non-compliance with anti-seismic measures. The latter one is related to the ability of science to propose effective solutions to minimize the consequences, mostly to predict the earthquakes and the characteristics of the expected strong earthquake impacts, as well as to suggest safe methods for securing the building construction. In the present study, the seismic hazard, seismic risk and space-time variations of seismicity in the urban areas of Blagoevgrad – Bansko – Gotse Delchev are analyzed in accordance with the requirements of Eurocode 8. These cities are located into the Kresna-Struma fault system and are characterized by high seismic hazard. On the other hand, the area is situated in mountain terrains with very favorable development prospects, for example, to this territory belongs the ski resort in the town of Bansko. This research is a part of the RISKSLIDES "Risk management of natural and anthropogenic landslides in the Greek-Bulgarian cross-border region" pro-

ject under the European Territorial Cooperation Program "Greece-Bulgaria 2007–2013". It is related to the implementation of a specific task of the project plan, namely the analysis of the degree of landslides risk management along the route "Bansko (Razlog) – G. Delchev".

Keywords: Seismicity, Eurocode 8, Kresna – Struma seismic area

POSTER SESSION

2.

P2.5

**MANAGEMENT OF URBAN
AND INDUSTRIAL WASTE
AND WASTE WATER**



ps2.5–01

PROJECTS FROM RECYCLING GLASS WASTE - ENERGY ANALYSIS

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Abstract: The recycling of paper, metal and plastic on the territory of the Republic of Macedonia is already covered by many companies as it is not the case with glass waste. Waste glass packaging is a global problem in Macedonia and worldwide. The Republic of Macedonia does not have any glass production facilities, and the consumption of it has increased significantly over the past decade. This trend continues to grow, thus more and more waste glass is being generated. Unfortunately, there is no installation for recovery of waste glass in the Republic of Macedonia, although worldwide experiences show that this waste represents a valuable raw material. Glass is one of the few materials in nature that can be endlessly recycled. The purpose of this paper is to demonstrate the process of optimization of utilization of waste glass packaging and its application.

Key words: glass, waste, recycling, reuse, glass roof tiles

CHEMICAL VAPOR DEPOSITION OF GRAPHENE ON COPPER SUBSTRATE

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Abstract: Graphene is a single layer of carbon atoms with unique characteristics. Because the excellent properties, strength, optical, electrical conductivity, now graphene is the most abundant material. It is flexible and transparent material promising in electronic industry. Typically, industrial production of graphene is by chemical vapor deposition (CVD) of graphene using methane, ethane and acetylene as precursors and solid metal catalysts Cu, Ni, Pt and Fe as substrates. In this work waste mixture of high density polyethylene (HDPE) and polypropylene (PP) was used as carbon precursor and Cu as substrate, catalyst. Synthesis of graphene from waste plastics was carried out into two stage process. First HDPE in inert atmosphere was pyrolytic converted into gas fuel using Al_2O_3 and opalized silicate – tuff as catalysts, then in the second stage graphene was deposited on copper foils. Two serial connected pyrex glass tubes placed into furnaces at 550°C and 850°C were used as plug flow reactors. Confirmation of deposited graphene films on the Cu foils was performed using Raman spectroscopy analysis.

Key words: graphene, chemical vapor deposition, pyrex glass reactor, high density polyethylene, Raman spectroscopy analysis

CHARACTERISTICS OF LAND POLLUTION WITH HEAVY METALS IN MITROVICA AND ENVIRONMENTAL AND SOCIO-ECONOMIC EFFECTS

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Abstract: Mitrovica is known as one of the most industrial cities not only in Kosovo but wider. The industry is mainly mineral-metallurgical, with an entirely technological process right from the ore exploitation. Among the biggest problems that Mitrovica is facing are the landfills of industrial waste and pollutions caused by mineral-metallurgical activity which has a long term impact on air, water and land and health effects on humans, plants and animals which are located near these landfills that stretch out on the suburban part of the city of Mitrovica in a distance of 1 to 4 kilometers. As a result of the work activity that covers a span of over 8 decades, a large quantity of industrial waste has accumulated and was placed in landfills which are passive but also in those which are still active and which can be found along the river banks. This industrial waste consists of heavy metals such as lead, zinc, silver and other rare metals which are still untreated. A part of this waste has an economic value and it can be materialized through the recycling process as a result of which the terrain would be cleaned and the environment would be cleaner. Soil samples were obtained based on the depth of land and spatial expansion, in various locations of the municipality of Mitrovica, and were analyzed by lab methods, such as Atomic Absorption Spectroscopy Method (AAS) and Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES). The obtained results showed that the pollution varies in different locations where some locations have enormous values of heavy metals and in some locations these values are within the allowed limit, whereas in terms of depth of land, these values are reduced to minimum. The biggest pollutions were observed near the factory and in the vicinity where the landfills are located and in the direction of the phenomenon of wind rose.

Key words: landfill, industrial waste, land, heavy metals, wind rose

EVALUATION OF KINETIC PARAMETERS OF CATALYTIC DEGRADATION

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Abstract: The aim of this work is to provide knowledge on catalytic degradation of waste mixture of high density polyethylene (HDPE) and propylene (PP) by thermogravimetric analysis (TGA). All experiments have been conducted in temperatures range 293-873 K, utilizing heating rates of 3, 5, 7, 10 and 20 Kmin⁻¹. TG experiments have shown the efficiency of different amounts of ZSM-5 catalyst in polyolefin degradation. The obtained TG curves indicate that catalytic process of pyrolysis occurs in one-step degradation. The apparent kinetic parameters such as activation (E_a) energy and pre exponential (A) factor have been determined using an integral iso-conversion Flynn-Wall-Ozawa model free method.

Keywords: Non-isothermal kinetics, Thermal degradation, Kinetic parameters, Model free methods

TREATMENT OF WASTE WATER IN LEATHER INDUSTRY

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Abstract: A very important issue in the leather industry is the use of a variety of chemicals that are harmful if released into the environment especially the effluents that are released in the rivers. In the leather manufacture and processing industry, a vast amount of water is used where the quantity depending on the type and technological treatment employed. Therefore, the effluents from the different treatments vary in the type and content of various chemicals. In order to prevent the environmental pollution of the rivers-recipient of these effluents, it is necessary to develop and employ appropriate waste water treatment procedures for their purification prior to release in the environment. In this work, several concepts are suggested that may be employed for waste water treatment in the leather industry. These concepts use both classical and modern methodologies for waste water treatment by handling the overall combined effluent after homogenization and precipitation or by using separate treatments of effluents from different leather production phases. Special attention in this study has been paid to the treatments for elimination of chromium and sulphides from the waste waters from leather industry.

Key words: leather industry; waste water treatment; chromium; sulphides

ASSESSMENT OF HEAVY METALS IN SOIL IMPACT OF SOLID WASTE LEACHATES LANDFILLS

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Abstract: Landfills for solid urban waste in Kosovo have been built between 2002-2005, which are divided in 7 landfill layers in 7 cities around Kosovo. Four landfills were selected in this study based on their size and age, amount of waste disposed, geographical positions, activity and control method and climate variability. The purpose of this research was to study the concentration of heavy metals in soil around landfills influenced of solid waste leachates from Landfills. The assessment of heavy metals in soil impact of emission landfills are included in Peja, Prizren, Podujeva and Gjilan. A comprehensive assessment of heavy metals is done for the presence of metals on soil and landfills leachate. Heavy metals are analyzed as; Zn, Cd, Ni, Cu, Pb, Cr, Fe, As dhe Hg. The soil samples and Leachate were taken into an along distance of 40 to 960m from landfills. The assessment of heavy metals was important to know the soil texture. Fractions of soil texture have resulted as, sand represented as 59.8 to 62.7%, Lyme 27.6–33.5%, and clay starting from 6.7 to 8.1%. The texture of soil indicates that the sand is the dominant factor, which enables the wastewater penetration into the depth of the earth. The results of this study show that leachates from landfills possess high contamination potential for water surface and soil. Heavy metals concentrations in soil samples and water samples showed that all the metals analyzed are present in both mediums. In soil samples the concentration of Ni was over EU and national standards, which was from 78.1–92 mg/kg, in soil samples around the Prizren and Podujeva landfills. In water samples in Podujeva and Prizen, concentration of Ni was max values 0.14–0.16 mg/l, or average values of 0.04–0.072 mg/l. The lead was 52 mg/kg, in soil samples in Podujeva landfill, while the lead concentration in the water samples in Podujeva, was max values 0.14 mg/l. The concentrations of all other heavy metals in leachate and soil are detected. Results obtained in this study reveal that the quality of the water surface and soil underlying landfill site has been impacted.

Key words: landfill waste, leachate, land contamination

POSTER SESSION

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**CLIMATE CHANGE – BIODIVERSITY
– ENERGY EFFICIENCY**



FLOODS ON THE RIVER BELICA AT JAGODINA, SERBIA IN 2014

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Abstract: Based on the assessment of damages caused by the catastrophic floods the Commission of the "European Bank" for Reconstruction and Development (EBRD) has estimated the damage in Serbia from 1, 5 to 2 billion euro and in Bosnia and Herzegovina, around 1, 3 billion euros. The damage that Serbia has suffered in the floods was greater than 0.64% of gross national income. The flooding has affected 39 municipalities, i.e. 1 643 832 inhabitants. The total number of evacuated citizens was 31 879. Out of 2 260 submerged objects 1 763 were devastated and totally destroyed, not counting Obrenovac. In this paper were analyzed the floods that occurred as a result of a cyclone activity. The cyclone generated the rainfalls of high intensity. The reconstruction of the flood wave on the river Belica was made by the method of "recording high water levels." Through subsequent recordings of the flow profile morphology, watercourse and riverbed reach, the dimensions of the riverbed were defined. For recording was used a surveying instrument, the total station "TOPCON 3100M". On the basis of the registered traces of high waters, a combined method and application of software "Hec-Ras" the flow capacity of the riverbed was determined, and also the registered flow meter readings on the flow profile of the watercourse.

Key words: flash floods, Hec-Ras, Belica, traces of high waters, floods

MESOZOOPLANKTON IN THE ROMANIAN BLACK SEA AREA – FOOD SOURCE FOR SHORT-LIVED FISH SPECIES

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Abstract: Mesozooplankton, the dominant trophic link between primary production and fish, represents the trophic base for short-lived fish species. Mesozooplankton samples, together with the fish samples collected from the Romanian Black Sea area in June and September 2016 and April and September 2017, were analyzed to determine the community structure and its importance for fish, as well as the food array for fish species. In June 2016, meroplankton reached the highest density and biomass values, while in September Copepoda represented the main group of the community. In 2017, both in April and September, Copepoda reached again the highest values, being better represented. The analyzed fishes showed food preference for Copepoda, with 46%, and Bivalvia, with 42%, in 2016, while in 2017 the percentage was higher for Copepoda, with 86%, while Bivalvia represented only 10% from the food array. The quantity and quality of food consumed is of very high importance for fish development and reproduction.

Acknowledgments. The research leading to the results herein presented has been undertaken in the frame of the project “IntelliGent Oceanographically-based short-term fishery FORecasting applicaTions” (GOFORIT), funded by the Romanian Executive Unit for Financing Higher Education, Research, Development and Innovation (UEFISCDI Contract no. 27/2015) through the ERA-COFASP Programme.

Key words: mesozooplankton, food array, short-lived fish species

EMISSION REDUCTION BY EFFICIENCY IMPROVEMENT OF KILNS IN MINERAL PROCESSING INDUSTRY

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Abstract: The essential part of the refractory materials production on a basis of sintered dolomite as raw material is the process of dolomite calcination. The technology process usually takes place in shaft or rotary kilns, where the dolomite stone ($\text{CaMg}(\text{CO}_3)_2$) is subjected to a high-temperature heat treatment. The calcination of the dolomite is highly endothermic reaction, requiring significant amount of thermal energy to produce sintered dolomite ($\text{CaO}\cdot\text{MgO}$), generating a large flow of hot gases at the furnace outlet. The primary target of optimisation in the process of sintered dolomite production is decreasing of fuel consumption and mitigation of the related environmental impact, including the release of greenhouse gases, particularly CO_2 . The objective of this work was to assess the possibilities of utilisation of waste heat of exhaust gases from a shaft kiln in order to improve the overall energy efficiency of the technology process. Several different options were analysed: (1) Preheating of a raw material, (2) Preheating of heavy fuel oil, (3) Preheating of combustion air, (4) Preheating of combustion air and raw material with flue gas and (5) Preheating of air for combustion and for drying of a raw material. The fifth option was selected as the most attractive and therefore it was analysed in more details, showing significant annual energy savings and relatively short simple payback period on the investment. The potential reduction of harmful global and local emissions by implementation of the proposed measure was also assessed.

Key words: Energy efficiency, shaft kiln, thermal processing, dolomite calcination, CO_2 emission.

INFLUENCE OF GELATINOUS ZOOPLANKTON ON THE DISTRIBUTION OF JUVENILE SPRAT (*SPRATTUS SPRATTUS* LINNAEUS, 1758) IN THE NORTHERN PART OF THE ROMANIAN BLACK SEA COAST

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Abstract: Gelatinous zooplankton plays an important role in the Black Sea ecosystem, with variations of density influenced by temperature, water mass flow and food. Many of these species feed on mesozooplankton and fish larvae. Zooplankton samples were taken with the Hansen net, which were taken from the depths between 10 and 35 meters in the northern part of the Romanian Black Sea coast in 2017. The species identified are represented by the scyphozoan *Aurelia aurita*, and the ctenophores *Pleurobrachia pileus*, *Mnemiopsis leidy*, *Beroe ovata*. The gelatinous zooplankton recorded the maximum density values for *Pleurobrachia pileus* - 265 individuals in the whole sample, and the maximum biomass was recorded by the scyphozoan *Aurelia aurita*, with the value of 0.761 g/m³. This paper aims to indicate the influence of gelatinous zooplankton on the distribution of juvenile sprat in the northern part of the Romanian Black Sea coast. Comparing the abundance and distribution of sprat juvenile with gelatinous zooplankton, a clear negative correlation emerges: whenever gelatinous zooplankton is highly abundant, sprat juveniles' abundance drops. However, other environmental parameters (e.g. temperature) must also be taken into consideration.

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Key words: gelatinous zooplankton, sprat, abundance, distribution

INFLUENCE OF THE MILLS MAINTENANCE ON THEIR CAPACITY AND CAPACITY OF THE BOILER

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Abstract: The good working condition of the mills is very important for boilers which use coal dust. The mills are very important for Power plants, because their work direct have influence of the combustion process in the boiler furnace. On time control of the mills condition and their correct repairing during revision in accordance technical standards enable unhindered work of the mills with maximal load which directly enable increasing of the heat in the boiler, depend of the coal quality. It continues of the paper are show the characteristic, parameters and capacity of the fans mills during tests: before overhaul (current maintained, partially repaired with a lot short comings) and after overhaul (with complete repairing). On the basis of the received results, is made comparative analyze for influence of the mills condition to the boiler capacity and in the same time of the Power Plant capacity. In order to reach better characteristic of the mills, in the end of paper are mentioned necessary measures which have to done.

Key words: mill, coal, capacity, properly repairing etc.

EVALUATING THE INLAND WATERS OF THESSALY REGION (CENTRAL GREECE), ACCORDING THEIR FISH FAUNA AND THE INTERNATIONAL LEGISLATION THAT PROTECTS IT

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Abstract: Rivers and lakes contribute environmental stability, providing many useful conveniences for society, biodiversity and fishery. These valued purposes are the consequence of the unique natural characteristics of ecological sensitive systems as rivers and lakes for the conservation of their fish fauna and their general ecological stability. In this study it was recorded the freshwater fish fauna of the main rivers and lakes in the Region of Thessaly (Greece) and it was considered the current protection status for each fish species according the E.U. Regulation for Ecotopes (92/43/EEC), the Bern's Convention, the IUCN 'Red List' of threatened vertebrates, and the Greek Red List of fresh water fishes. Then their threats were categorized and the proper management strategies and legislation needs for its protection were specified. The knowledge of environmental legislation which regards the threatened fish fauna, constitutes a key parameter for biodiversity protection of environmentally sensitive inland water ecosystems such as rivers and lakes, aiming to their rational management and conservation.

Key words: fish fauna, inland waters, rivers, lakes, fish species, protection status, Red List, Thessaly, Greece

OPTIONS FOR EFFICIENCY ENHANCEMENT AND NOX EMISSION REDUCTION OF UTILITY COAL-FIRED STEAM GENERATOR

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Abstract: As fossil fuels dominate the world primary energy supply and will do it at least for the next few decades, further improvement of the fossil-fueled power plants is needed due to many reasons, including the environmental impact and plant economic operation. The operation of thermal power plants is commonly evaluated on a basis of the energy analysis, combustion efficiency and the level of harmful emissions generated. Therefore, the necessity to burn fuels more efficiently, while producing less emissions remains an important challenge and responsibility. Often, the real useful energy loss cannot be completely justified only by the first law of thermodynamics, since it does not differentiate between the quality and amount of energy. The objective of the work is to perform a steady-state simulation in order to identify the locations, sources and magnitude of thermo-dynamic inefficiencies in the utility steam generator, as one of the key components of a thermal power plant. The work deals with an analysis of the energy and exergy balances and losses in a coal-fired steam generator, which is a part of a 315 MWe power generation unit. The steam generator is designed for operation on low grade coal – lignite with net calorific value in a range 6280-9211 kJ/kg, in a steam cycle at 545 °C/177.4 bar, with feed water temperature 251 °C. The combustion air is preheated to 272 °C in two rotating air-heaters and the flue gases mean temperature at the outlet is 160 °C. Since the largest exergy dissipation in the thermal power plant cycle occurs in the steam generator, energy and exergy balances of the furnace and heat exchanging surfaces are established in order to identify the main sources of inefficiency. The zone calculation method is used for determination of temperature profiles and heat distribution along the boiler gas path. An engineering method is used for estimation of the NO_x emission. On a basis of the conducted

analysis several measures for improvement are envisaged, including retrofitting option of lignite pre-drying with flue gases and air preheating with dryer exhaust gases.

Key words: thermal power plant, steam generator, exergy, energy efficiency, combustion, NOx.

FORECAST AND SENSITIVITY ANALYSIS FOR THE RECRUITMENT/SPAWNING STOCK BIOMASS RELATIONSHIP IN BLACK SEA SPRAT (*SPRATTUS SPRATTUS* LINNAEUS, 1758)

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Abstract: For fisheries to be truly managed within an ecosystem-based framework, they also need to accommodate how the ecosystem affects the fish populations and fisheries themselves. This consideration is particularly relevant to the short-lived species, such as *Sprattus sprattus* (Linnaeus, 1758), because of their strong sensitivity to environmental fluctuations. In this context, the activities within the GOFORIT project (Intelligent Oceanographically-based short-term fishery FOREcasting applications”) mainly focus on identifying relevant correlations between environmental variables and Black Sea sprat parameters. In order to perform forecasts and sensitivity analysis, spawning stock biomass (SSB) and recruitment (R) were correlated with several ecosystem parameters (phytoplankton, zooplankton and temperature) for time series covering the period 1951-2014. The results of forecasting and sensitivity analysis applied to sprat recruitment and spawning stock biomass data correlated with temperature, phytoplankton and zooplankton in the Black Sea revealed that, like most pelagic species, sprat stocks have been heavily influenced by variations in environmental conditions. The forecast for the models which involve phytoplankton and temperature proved to be realistic and reliable. Regarding sensitivity analysis, phytoplankton and temperature have a major influence on SSB. The zooplankton model with Romanian data was also quite realistic. Regarding the zooplankton model with data from Turkey, there are two situations: a) for the time series 1980-1999, the forecast is very good, moreover for 1992-1998 the forecast lines overlap the real lines; $\ln(R/SSB)$ is very sensitive to zooplankton fluctuations, when SSB has opposite direction compared to zooplankton, and when SSB and zooplankton have the same direction, SSB neutralizes the effect of zooplankton. The exception is the sensitivity analysis for small zooplankton, where $\ln(R/SSB)$ is not sensitive to zooplankton fluctuations; b)

for the time series 1997-2013, the forecast is very bad (unrealistic) and $\ln(R/SSB)$ is very sensitive to zooplankton oscillations. The utility of this research resides in identifying the links between the ecology of short-lived fish species and certain environmental factors at time scales relevant to annual stock assessment and advisory cycles, and use this new knowledge in forecasts. Furthermore, the improvement of operational forecasts of upcoming year classes of short lived pelagic species can enable better planning and produce stability at all stages (fishing, processing and selling) in the operation of the fisheries and industries depending on these stocks, thus also having economic effects in the long run.

Acknowledgments: The research leading to the results herein presented has been undertaken in the frame of the project “IntelliGent Oceanographically-based short-term fishery FORecasting applicaTions” (GOFORIT), funded by the Romanian Executive Unit for Financing Higher Education, Research, Development and Innovation (UEFISCDI Contract no. 27/2015) through the ERA-COFASP Programme.

Key words: sprat, ecosystem, recruitment (R), spawning-stock biomass (SSB), correlations

OVERVIEW OF THE HEALTH STATUS OF THE MAIN ROMANIAN BLACK SEA COAST FISH

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Abstract: Several natural and anthropogenic factors act on fish populations, reducing their abundance. In populations in the natural environment, it is difficult to isolate and quantify the effects of any of these factors on the size of the stock, such as predator destruction, lack of food or diseases. By diseases we understand a complex of phenomena and organic manifestations in interrelation with a pathogenic factor, from the moment of contact and until the consequences disappear. One of the major causes of illness can be pollution of seawater, by domestic and industrial discharges, which often leads to losses in the ichthyofauna, especially as a result of asphyxia and intoxication. Bacteria and parasite infestations are also a major issue of concern. During 2014 and 2017, the following fish species were analyzed from the point of view of health: sprat, anchovy, horse mackerel, turbot and flounder. In populations of turbot from the natural environment subjected to pathological analyzes, a number of diseases have been identified, mainly produced by bacteria and parasites. From the category of constitutional diseases in the specimens of turbot the presence of cutaneous fibroma has been identified. Microbiological analyzes of infectious diseases have revealed the existence of three infections caused by bacteria of the genera *Aeromonas*, *Vibrio* and *Pseudomonas*. The parasite fauna of turbot and flounder consisted of a small number of parasites, the parasitic intensities and extensities being large in the case of some analyzed specimens. The parasites determined in the samples analyzed were: *Trichodina domerguei*, *Contracaecum aduncum* and *Botriocephalus scorpii*. In the case of small fish, the main parasitic disease encountered was nematodosis caused by the following nematode species: *Contracaecum aduncum*, *Contracaecum* sp, *Porrocaecum* sp., *Anisakis* sp. Specific analyzes to assess the effects of nematode worm parasites on the state of the natural populations of these fish species revealed high values of the prevalence (infested fish percentage), higher

average infestation intensities and higher parasitic abundance in larger specimens compared to small-sized fish.

Acknowledgments: The research leading to the results herein presented has been undertaken in the frame of the project “IntelliGent Oceanographically-based short-term fishery FORecasting applicaTions” (GOFORIT), funded by the Romanian Executive Unit for Financing Higher Education, Research, Development and Innovation (UEFISCDI Contract no. 27/2015) through the ERA-COFASP Programme.

Key words: fish, health status, bacteria, parasites

QUANTITATIVE AND QUALITATIVE ANALYSIS OF JUVENILE FISH POPULATIONS OF THE ROMANIAN BLACK SEA COAST DURING 2016–2017

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Abstract: The quantitative and qualitative analysis of the most important fish species' juveniles is essential for the study of fish stocks. Between 2016 and 2017, studies were carried out to determine the distribution and abundance of sprat, anchovy, horse mackerel and whiting juveniles, which showed variations between the two years. Fish species stocks in the Romanian waters has been investigated in relation with abiotic environmental conditions and the evolution of the trophic base. During 2016 - 2017, four research expeditions at sea were organized with the research vessel “Steaua de Mare 1” in Romanian waters, as following: in May 2016 and May 2017 - 5 working days with pelagic trawl for sprat and whiting juveniles; in September 2016 and September 2017 - 5 working days with pelagic trawl for anchovy and horse mackerel juveniles. Sampling of juvenile fish samples was made using the pelagic trawl for juveniles by surface trawling (0-5 m) at 1.5-2 knots speed, the duration of the trawling being 15 minutes and the horizontal opening of the trawl 14 m. Using observations recorded in 2016 and 2017, it can be said that the state of the fish stock is quite unstable, with major fluctuations from one year to another, caused by environmental modification and fishing pressure on the fish population. The estimated relative abundance for sprat juveniles in May 2017 was less than 57 times than in the same period of the previous year. The study carried out in September 2017 showed the presence in a low number of samples of horse mackerel and anchovies, in comparison with September 2016. The biomass of anchovy juveniles was 79.67 t/area surveyed in September 2016 and 10.58 t/area surveyed in September 2017. The average catches ranged from 0.024 t/SqNm in 2016 and 0.0032 t/SqNm in 2017. The biomass of horse mackerel juveniles was 94.3 t/area surveyed in September 2016 and 22.1 t/area surveyed in September 2017. The average catches ranged from 0.0287

t/SqNm in 2016 and 0.0067 t/SqNm in 2017. As a follow-up of the analyzes carried out for the samples collected in September 2016 and September 2017, a decrease in the abundance and biomass of both analyzed species (anchovy and horse mackerel) was observed in 2017. These short lived pelagic species require environmentally friendly reproductive growth and development conditions, as well as commercial fishing measures for ensuring restocking and increase of stocks.

Acknowledgments: The research leading to the results herein presented has been undertaken in the frame of the project “IntelliGent Oceanographically-based short-term fishery FORecasting applicaTions” (GOFORIT), funded by the Romanian Executive Unit for Financing Higher Education, Research, Development and Innovation (UEFISCDI Contract no. 27/2015) through the ERA-COFASP Programme.

Key words: analysis, juvenile, fish, abundance, biomass, environmental modification

CONTRIBUTION TO THE KNOWLEDGE OF DRAGONFLY FAUNA OF THE SITNICA RIVER IN KOSOVO (INSECTA: ODONATA)

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Abstract: The Fauna of Odonata (Dragonflies) in Kosovo has been studied very little, so the data for this insect order are very poor. In this paper are presented the first data on the composition of fauna of Odonata of the Sitnica River. Adult dragonflies were studied along the river course during the August 2017. Sitnica River is 90 km long, it flows to the north, into the Ibar River and belongs to the Black Sea drainage basin. During this research 11 Odonata species have been recorded, 6 of which are Zygoptera and 5 Anisoptera. The most abundant species were *Calopteryx splendens* and *Platycnemis pennipes*.

Key words: Dragonflies, Sitnica River, abundant species, Zygoptera, Anisoptera

POSTER SECTION

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P2.78

**GREEN SMART CITIES / SOCIETIES –
GREEN ARCHITECTURE, LANDSCAPE
DESIGN AND TRANSPORT**



SUSTAINABILITY, ACCESSIBILITY AND ENERGY EFFICIENCY ASPECTS OF CONVEYING SYSTEMS

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Abstract: Vertical transportation planning is having a critical role in urban and building design. It has become a source of integrated and synergetic task of professionals involved in the design, from the project conception until building turnover, operation and maintenance of the buildings. Planning, design and construction of the conveying systems in contemporary architecture include researching human factors, geography and social aspects, accessibility per the applicable codes, foreseeing the future use and vertical communication in the building, roles and functions of the tenants in the building, focused on all challenges by addressing tenants needs in a most suitable manner. In high rises, the design team must understand all demands arising from building type, occupancy type, optimal selection of the elevator's smart and sustainable technology, equipment type and placement, importance of the traffic study as the project delivery evolves in phases, energy demand, energy efficiency and measuring. As more tall buildings are designed mixed-use as oppose to single-use as it was in the past, all these aspects become fundamental in urban planning. Delivering a decision that enables reliable, sustainable and energy efficient vertical transportation on one side, researching and designing to meet the human complex cultural specifics and requirements, on the other hand, is a multifold problem facing challenges. It relates to subjective and objective components encompassed in numerous research fields to be included in the design considerations: architecture, engineering, ergonomics, manufacturing and technical aspects, economical aspects, sustainability, energy management and life safety. This paper proposes a conceptual hierarchical schematic categorizing and classifying the identified aspects, attributes and criteria assistive and relevant throughout the process of delivering a sound decision when choosing an optimal vertical transport for a specific building type. It also shows the im-

portance of accessibility for all, by example of the requirements for systems in jurisdictions governed by the Americans with Disabilities Act (ADA), and local building codes, which vary by the occupancy, location and building height. The proposed schematic conforms to the contemporary standards for energy efficiency according to VDI 4701, and design in the related field. At the same time conforms to the sustainability scheme, such as building sustainability certification per the most popular LEED or BREEAM focusing on the specific requirements of the vertical transport as related to the building, occupancy, Architect's design and final users' needs and prerequisites.

Key words: vertical transportation, traffic analysis, accessibility, energy management, sustainable development, decision making

STUDY ON THE IMPORTANCE OF PHYSICO-CHEMICAL CHARACTERISTICS FROM THE WALLS IN THE REHABILITATION WORKS OF HERITAGE BUILDINGS

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Abstract: It is well - known that the most frequent cause of the degradation of heritage buildings is related to the presence of water because all the traditional materials used, are more or less porous and constitute the support of water migration in the form of salt solutions. In order to establish the technological solution for control humidity, it is extremely important to know the causes that led to the degradation of the building, subsequently establishing the technological solution to be used to eradicate humidity from foundations and walls. Establishing the execution technology is closely related to the preliminary investigation, so physicochemical investigations play an extremely important role. The investigated objective is Wing C of "1 Decembrie 1918" University of Alba Iulia. Several archaeological, architectural, historical, cultural interdisciplinary research has been carried out on this building and on the degradation of the masonry. The paper highlights the importance of determining the physicochemical characteristics in order to establish the rehabilitation technology.

Key words: cultural heritage building, walls degradation,
physicochemical characteristics

HEALTH NUTRITION IN THE BULGARIAN COMMUNITY – CONTEMPORARY APPROACHES

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Abstract: The concept of health nutrition in recent years addresses global public health issues. Food is essential not only for the development, growth and maintenance of body functions. All treatments begin with prophylaxis and nutrition and are then followed by modern therapies. Insufficient, unbalanced and overindulgent nutrition has adverse effects on body function, health status and quality of life. The purpose of the present article is to present some of the contemporary approaches and priorities in the promotion of healthy eating habits in Bulgaria, in the context of the changing social reality. During the past decades, unfavorable characteristics and trends in the nutrition of the Bulgarian population have been observed. This has led to the establishment of nutrition and health strategies which conform with the recommendations of the European Union (EU) and the World Health Organization (WHO). Health nutrition habits are primarily a matter of personal choice and motivation. Therefore, it is necessary to implement a coordinated, national nutrition policy to stimulate the individual responsibility for building healthy eating habits.

Key words: health nutrition, health promotion, contemporary approaches

KINETIC MODELS FOR THE LEAD BIOACCUMULATION AND MITOTIC INDEX IN LEAD-POISONED AND ZEOLITE-TREATED LABORATORY MICE

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Abstract: Clinoptilolite sorbent KLS-10-MA versus lead toxicity is applied for the first time. The dietary inclusion of the sorbent reduces lead (Pb) concentration in the exposed and supplemented laboratory mice by 84%, 89%, 91%, 77% and 88%, in carcass, liver, kidneys, bones, and feces, respectively. There are observed 3.8-fold higher chromosome aberrations frequency (CAF), 2.9-fold lower mitotic index (MI), 2.3-fold more pathological erythrocytes, and 1.3-fold lower body weight toward the Control group in the Pb-poisoned mice; and 1.9-fold higher CAF, 1.16-fold lower MI, 1.9-fold more pathological erythrocytes, and 1.03-fold lower body weight toward the Control group in the Pb-poisoned and sorbent-supplemented mice. On the basis of the mathematical model the coefficient of Pb-absorption by gastrointestinal mucosa in the supplemented mice is found: $\eta = 3.53\%$ (versus $\eta = 15\%$ in non-supplemented ones). For the first time a mathematical model is constructed for the change of the mitotic index in conditions of chronic intoxication. The model clearly shows that the recovery processes in the animals run in parallel with the Pb bioaccumulation and that the susceptibility of the mouse's organism to Pb load decreases and the recovery rate of the genetic apparatus increases during the experiment.

Key words: Lead bioaccumulation, clinoptilolite, chromosome aberrations, mitotic index, kinetic models

HEAVY METAL CONTAMINATION OF *RAPANA VENOSA* (VALENCIENNES, 1846) AT THE ROMANIAN BLACK SEA COAST

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Abstract: In recent years, the pollution extent of coastal areas has increased and, consequently, it has become one of the major threats to marine species. The Romanian coast is no exception. The gastropod *Rapana venosa* (Valenciennes, 1846) is an invasive species, which penetrated Romanian coastal waters around 1963. Starting with 2009, it has become a target species of Romanian fishery catches. The rapa whelk (*R. venosa*) commercial fisheries have developed mainly due to the external market demand. There is no updated study on heavy metal contamination of this gastropod's meat in the Romanian Black Sea for recent years. Such a study is necessary due to the fact that the main food of the rapa whelk is the mussel *Mytilus galloprovincialis*, which is a filter feeder, thus accumulating potential harmful substances from the aquatic environment. In its turn, *R. venosa* is a food source for humans and, consequently, the chemicals bioaccumulated may reach the human body. Under such circumstances, the aim of this paper is to assess the heavy metal (Cu, Cd, Pb, Ni, Cr) content recorded by *R. venosa* tissue, harvested along the Romanian Black Sea coast. Heavy metal values in *R. venosa* tissue recorded wide variations, but most samples (85%) did not exceed the allowable values for Cd and Pb, recommended by EC Regulation 1881/2006 on heavy metal values in shellfish (1 µg/g WW Cd and 1.50 µg/g WW Pb).

Key-words: *Rapana venosa*, pollutants, heavy metals, bioaccumulation

MARINE LITTER ASSESSMENT IN COSTAL WATERS OF DURRES BAY (ALBANIA)

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Abstract: The most important maritime activities in Albania are (marine) tourism, fisheries and maritime transport. Main sources of littering of the sea environment are from mainland activities: tourism and recreation, river outflows, sewage disposals, landfills near coast, incorrect waste management in coastal cities, industry. In addition to this, marine activities as sea traffic, fishery and mariculture also contribute its part to the pollution. Thoroughly 45 % of all pieces of waste on the coast of Albania are from plastic. And if we know that secondary microplastics are plastic fragments derived from the breakdown of larger plastic debris, we have a lot of input sources. The study of microplastic particles within the DeFishGear project represents the first thorough study that will collect data on the presence, quantity and type of microplastic particles on the sea surface. The sampling was conducted according to the recommendations "Sea surface sampling" from protocol "Recommendation on regional approach to monitoring and assessment of microplastic in the marine environment", from Viršek *et al.* version December 2015. Samples were collected in sampling sites S₁, S₂, S₃, S₄, S₅ from sea surface of Durres bay in January 2016. The amount of microparticles found in sea surface samples was in range from 84'236 – 264'501 particles per km² (Nr/km²) with minimum abundance on sampling site S₁ and maximum abundance on sampling site S₅. In average there were 153'667 particles per km² in sea at the coast of Albania on both sampling days in January 2016. The weight of the microparticles of the sea surface samples followed different trend as observed for the number of microplastic. The weight of microparticles in samples was in range from 81294.3-102532.3 g/km², with minimum weight at sampling site S₃ and maximum weight at sampling site S₄. In all the sampling sites filaments were predominant type of the microplastic composition, ranging from 43.7 - 79.2% with minimum at sampling site S₁ and maximum at sampling site S₅. The most microparticles, mostly filaments, was found in *Pagellus erythrinus* that feeds low in the food chain.

It is omnivorous, but mainly feeds on smaller fish and benthic invertebrates either as direct primary consumers and detritivores, or at a secondary level feeding on small macrofauna, what means it eat on the shallow bottom floor and on the sea surface, preferably near waste waters and marinas.

Key words: plastic pollution, urbanization, seafood, Durres bay.

EVIDENCE OF GENOTOXICITY IN MICE EXPOSED TO EXTREMELY LOW FREQUENCY ELECTROMAGNETIC FIELDS COMPARED WITH IONIZING RADIATION AND A CHEMICAL MUTAGEN

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Abstract: Hardly any phenomenon in the modern environment is as ubiquitous as electromagnetic fields (EMFs) and waves, encompassing a very broad range of frequencies. The aim of the current study was to evaluate the genotoxic potential of 60-Hz EMFs compared with ionizing (gamma rays) radiation and Mitomycin-(MMC), a well-known genotoxic agent. Sexually mature, 12-week-old male BALB/c mice were used. Twelve treatment regimens were considered: (1) animals exposed to 0.1Gy of gamma rays, (2) 0.2 Gy, (3) 1.0 Gy, (4) 5mg/Kg MMC, (5) 0.1 Gy + MMC, (6) 0.2 Gy + MMC, (7) 1.0 Gy + MMC, (8) 1.0 mT EMF, (9) 1.5 mT EMF, (10) 2.0 mT EMF, (11) 2.0 mT EMF + MMC, and (12) controls, animals not exposed to any physical or chemical agents. The evaluated cytological endpoint included the frequency of micronucleated polychromatic erythrocytes (MN) in bone marrow. Statistically significant differences indicative of genotoxic effect were observed for MN frequency in 1.0 Gy of gamma rays exposed animals, in 1.5 and 2.0 EMF exposed animals, and in MMC-treated mice when compared with controls. In addition, a synergist effect between gamma rays and MMC in terms of MN frequency was observed for this co-exposure condition. On the contrary, an antagonistic effect between EMF treatment and MMC was observed. In conclusion, the present study indicates the *in vivo* susceptibility of mammals to the genotoxicity potential of EMFs compared with ionizing radiation and a chemical mutagen.

Key words: Extremely low frequency magnetic fields, ionizing radiation, chemical mutagens, micronucleus test, genotoxicity

NEGATIVITIES OF QUARRIES ON THE KYRENIA MOUNTAINS TOWARDS NATURAL ENVIRONMENT AND HUMAN HEALTH

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Abstract: The first quarry on the Kyrenia Mountains was opened in Değirmenlik to provide supply for the construction of Nicosia-Famagusta road. Then this continued with the quarry in the north of Alemdağ for the construction of Morphou-Nicosia highway and despite the completion of both roads, the quarries remained open. In accordance with the 2017 data, the quarries on the Kyrenia Mountains expanded to an area of 651 000 square meter. Out of the 36 operating companies, 16 of them are for crushed stone sand, 11 for float stone, 6 for cut stone, 2 for gypsum and 1 for river sand and gravel. The surface pit industry of the quarries in Cyprus creates major environmental impacts. Such open quarries directly target the top part of earth crust and cause geomorphological changes that is not irremediable in a short period. The environmental organisations consider such scene as the disaster of century and the settlers close to the quarries react against such situation. The problems about the quarries are at the maximum level in the residential areas such as Akçiçek, Alemdağ etc. that are at close distance. During the drilling and detonation processes in the quarries, a number of impact arises such as scattered stones, air cannon and ground vibration as well as environmental impact like dust, contamination in the underground and ground water resources, displacement and exposure, visual pollution and loss of land during the size reduction processes. Consequently, this study identified that the fatal accidents on the Kyrenia Mountains and Değirmenlik road have increased and the lorries and trucks carrying excavations from the quarries have been responsible from these accidents.

Key words: North Cyprus, environmental impact, quarries, Kyrenia Mountains, accidents.

EVALUATION OF BTEX EXPOSURE IN INDOOR AIR WITH INTERA IN SOUTHEAST BULGARIA

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Abstract: Air quality in the rooms is part of the internal environment, which includes physical factors and psychological aspects. The quality of air in a rooms can be exacerbated by volatile organic compounds generated inside the room. The group of volatile organic compounds consists of Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) emissions. The aim of this study was to assess the negative impact on human health of various chemical contaminants in schools and kindergartens. Studies covering southeast Bulgaria, during the July and October 2015, affecting the most vulnerable groups of residents 5 years and 5-15 years. Evaluation was based on grid computing space INTERA. From the data the impact on boys is most pronounced for the inhabitants of the site in the village Karamantsi, followed by secondary schools in Haskovo and Kardzhali, which achieved doses reach 8.1 – 17.0 $\mu\text{g}/\text{m}^3$. When acetaldehyde achieved dose is high for a site in the village Shiroko Pole - 8.4 $\mu\text{g}/\text{m}^3$. All calculated by the platform rate targets show that relatively high values of the studied indicators refer to sites where they carried out repair and renovation works, during which was not sufficiently careful selection of materials and techniques or in other words The potential health risk from the issue of chemical contaminants has been consistently underestimated. For both genders other pollutants such as aliphatic hydrocarbons are much less significant impacts on the majority of the tested indicators are the limits of detection of these contaminants. Obviously, and the expected level of creating health risks they may deem negligible. Comparisons were made with the results of the monitoring of background loads. The experience of comparing the values obtained for chemical contaminants in the surveyed objects shows that there is a relationship both with background stresses and with the new introduced new materials and techniques in specific sites.

Key words: BTEX, indoor air pollution, exposure assessment, health

HELMINTH FAUNA OF PRESPA BLEAK (*ALBURNUS ALBURNUS BELVICA* KARAMAN, 1924) (PISCES: CYPRINIDAE) FROM MACEDONIAN PART OF LAKE PRESPA

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Abstract: Eight out of the eleven indigenous fish species of Prespa are endemic, i.e. they exist only in the Prespa region and in no other place on earth. One of these endemic fish species is Prespa bleak (*Alburnus alburnus belvica*). The parasitological examination from the Macedonian part of the Lake Prespa showed that all of 147 examined specimens of Prespa bleak fishes were infested (100.0%). In our case study the presence of 13 parasite species was established: *Dactylogyrus alatus f. typica*, *Dactylogyrus sphyrna*, *Paradiplozoon alburni*, *Allocreadium markewitschi*, *Phyllodistomum sp.*, *Posthodiplostomum cuticola* (larva), *Ligula intestinalis* (plerocerkoid), *Cystidicoloides tenuissima*, *Philometra ovata*, *Raphidascaris acus*, *Contracaecum microcephalum* (larva), *Metechinorhynchus truttae* and *Pomphorhynchus bosniacus*. Individually, by the parasite species, the highest prevalence was with *Posthodiplostomum cuticola* (larva) (100.0%), *Dactylogyrus alatus f. typica* (59.18%) and *Raphidascaris acus* (34.69%). The lowest one was with *Paradiplozoon alburni*, *Allocreadium markewitschi* and *Phyllodistomum sp.* (1.36%). In our case study the parasites *Dactylogyrus alatus f. typica*, *Dactylogyrus sphyrna* and *Paradiplozoon alburni* are recorded for the first time in the ichthyoparasitofauna of Lake Prespa and Macedonia.

Key words: helminth fauna, bleak, Lake Prespa

INFLUENCES OF STRUCTURAL GLASS ON WORKING ENVIRONMENT QUALITY AND HEALTHCARE BENEFITS

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Abstract: Structural glass is material which transparency allows abundant daylight, productivity gains as well as many health benefits. Many medically focused healthcare stages related to environment conditions are influenced by the direct amount of daylight provide by the design of the façade structure. Structural glass usage in the facades is mostly analyzed within the context of sustainability regarding energy consumption and increasing green building leverage, but certain studies show that human working life quality is also affected by it. This includes increasing serotonin level as well as lowering stress and depression levels. In order to achieve healthcare benefits, many forms of using structural glass are being suggested in the literature regarding specific design approaches towards its transparency and translucency levels without neglecting the stress state and strength of the glass panels. This paper presents brief literature review of the topic and possible design approaches regarding human productivity and healthcare in its working environment.

Key words: structural glass, healthcare benefits, working environment, structural design

OPTIMIZATION OF PARAMETERS FOR LOPERAMIDE BIOSORPTION ONTO LIGNOCELLULOSIC- Al_2O_3 HYBRID

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Abstract: The chemically modified lignocellulosic biomass with an inorganic oxide (Al_2O_3) was tested as a new sorbent for the removal of drug loperamide from aqueous solution in batch conditions. As a lignocellulosic base material *Lagenaria vulgaris* shell was used. In order to define optimal conditions for sorption of loperamide from water, by lignocellulosic- Al_2O_3 hybrid (LC- Al_2O_3), effects of initial pH, temperature, sorbent dosage, initial loperamide concentration and hydrodynamic conditions, were studied. The highest removal efficiency of loperamide was observed at neutral pH (pH from 5 to 8) and reached 99.5%. The increase in the solution temperature from 10.0 to 50.0°C led to an increase of removal efficiency of loperamide, indicating the process to be endothermic in nature. Optimal sorbent dosage was 2.0 g dm⁻³. With the increase of initial loperamide concentration, the removal efficiency decrease. In the absence of ultrasound equilibrium is attained after 120 min, but in the presence of ultrasound the sorption process was speeded up considerably (with ultrasound powers of 25 and 50 W, the equilibrium is attained after 40 and 20 min, respectively). In addition to the high removal efficiency, LC- Al_2O_3 hybrid possesses other benefits, like mechanical stability, ease of synthesis, cost-effectiveness, biocompatibility and environmental-friendliness, which all makes it a promising material for the removal of anionic pollutants from water.

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Key words: optimization, biosorption, removal, loperamide, wastewater treatment.

ENVIRONMENTAL ELECTROMAGNETIC POLLUTION DUE TO RADIATION LEAKAGE FROM MICROWAVE OVENS

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Abstract. This study compares the values of the electromagnetic fields generated by three types of microwave ovens with the values available in scientific literature, guides and protocols, taking into account their impact on human health. Variations in electromagnetic radiation have been determined during and outside the operating time of the microwave ovens at different distances from the oven and in different positions, thereof. The obtained data show higher values of the radiation leakage during operation than those provided by the regulations in force, for all types of studied ovens. The results of the study suggest the need to reduce the time spent near these devices and to optimize the equipment in order to reduce these radiation leakages.

Key words: microwave oven, electromagnetic field, radiation leakage, electromagnetic pollution, human health

INDEX OF AUTHORS

A

Adelajda Andoni, o6–03,
Aleksovski S., o6–04, o6–07, p2.5–02,
p2.5–04,
Alexandrov Laura, il–05,
Ali Özersoy. Derviş, o5–05,
Alimi Sh., p1.1–06,
Alin Teușdea, p1.4–10,
Allajbeu Sh., p1.1–01,
Almasan R., p1.1–03,
Ambarkov J., p1.1–02,
Ambarkova V., p1.1–02,
Andjelkovic Aleksandar, p2.6–01,
Andreopoulou Z., p1.4–08,
Angelov H., p1.3–03,
Angelova V., p1.4–01,
Angjeleska, A., s1–10,
Antonio Heredia-Rojas, J., p2.78–07,
Arapi D., o4–11,
Ataseven Y. o4–06, o4–03,
Atay-Kaya İlgi, o3–03,
Aurel Dărău, Petru, p1.4–10,

B

Bačeva-Andonovska K., o5–19,
Badea M., p2.78–13,
Bakova D., p2.78–03,
Balabanova, B., s1–05,
Baruti B., p2.5–03,
Bastas Mert, p2.78–08,
Belceva-Andreevska Jana, o5-01,
Beltcheva Michaela, p2.78–04, p2.78–07,
Berberova R., p2.2–02,
Berinde S. R., o3–08,
Berisha A., p2.5–06,
Biocanin R., o2–12,

Bisinicu Elena, p2.6–02, p2.6–04,
Bislimi Kemajl, p1.1–05,
Bjelic D., p1.1–07,
Blazhekovicj-Dimovska D., p2.78–10,
Bobric, E. D., p1.4–02, s1–02,
Boev, I. s1–03,
Bogoeva-Gaceva G. p2.5–04, o6–07,
Bogoevski, S., s1–10,
Bogunović Igor, o4–01,
Bojić Aleksandar, p2.78–12,
Bojić Danijela, p2.78–12,
Borojevic K., o2–12,
Boškovski, B. s1–10,
Bratfanof E., o5–07,
Brčeski I., p1.1–03,
Breabăn, I. G. o3–06, p1.4–02, s1–02,
Bungau, S., p2.78–13,
Bytyqi Pajtim, p1.1–04, p2.6–11,

C

Çabuk S., o5–03, o5–06,
Çadraku Hazir, p1.1–04,
Çahil A. p2.5–05,
Cakić Milorad, o2–15,
Cani Xhaklina, o6–03,
Castañeda-Garza Esperanza, p2.78–07,
Caushevski, A., o2–02,
Cetinel M., o5–10,
Çiçek G., o4–08,
Cinar, H. S., o5–11,
Cinije A., o4–11,
Cirstea Andreea, p1.3–13,
Cirstea Stefan, p1.3–13,
Clouvas Alexandros, o3–05,
Cononov C., o5–07,
Constantin C., p1.4–09,

Index of authors

Coroş, M. M., p1.3–14,
Costache Mihail, il–05,
Crceva-Nikolovska, R., s1–10,
Cristea Victor, p2.78–05,
Croitoru G., o2–09,
Cvetković Dragan, o2–13, o2–14, o2–15,

D

Daci, Nexhat, o1–11,
Daci,-Ajvazi Majlinda, o1–11,
Danilov Cristian, p2.6–10,
Danilov, Cristian Sorin, p2.78–05,
Danilović Bojana, o2–15,
Đekić J., o5–17,
Dellal İlkay, o5–16,
Dembovski G., o6–04,
Demirdöğen A., o4–04,
Demirtaş Ö., o4–02, o4–08,
Dimililer Raif, o5–05,
Dimitrieska-Stojković, E., s1–10,
Dimitrov D., o2–02, p1.3–03,
Dimitrovski D.,
Dimitrovski Dame, il–06, o1–08, o1–09,
o4–09, o5–09, o6–01, o6–05, p1.3–01,
p1.3–09, p2.5–01,
Dimitrovski Mile, il–02,
Dimoska M., o5–18,
Dimzova J. s1–04,
Dinić-Branković M., o5–17,
Djekovic Vojislav, p2.6–01,
Djokikij J., o2–03,
Djukanovic Gordana, p2.6–01,
Djuricic T., p1.1–07,
Dobrin A., p1.4–09,
Dobroshi F., p1.1–06,
Dobroshi K., p1.1–06,
Đokić-Stojanović Dušica, p1.3–11,
Doncheva E., p2.78–11,
Doneva N., o1–03,
Doneva, N., o1–06,
Đorđević Biljana, o2–13,
Đorđević Biljana, o2–14,
Đorđević Biljana, p1.3–11,

Đorđević, A., o1–09,
Dorin I., o2–09
Dragusheva S., p2.78–03,
Dukovski, V., o2–04,
Dzinlev V., p1.3–01,

E

Enea A., o3–06, p1.4–02,
Engin-Duran H. o3–03,
Esetlili, M. T., o4–08,

F

Fetoshi Osman, p1.1–04,
Filkoski, Risto V., o5–12, o5–13, p2.6–03,
p2.6–07,
Florin Boja, p1.4–10,
Floroian L., p2.78–13,
Fushtik, V., o2–02,

G

Gashi, Salih, o1–11,
Gateva S., p1.3–02, p1.3–03,
Georgievska Milijana, o6–06,
Gerasimova Tsvetelina, p2.78–04,
Gjinovci Valdet, p1.4–06,
Gjurchinovski Zlatko, p2.6–03,
Gjyli L., p2.78–06,
Golumbeanu Mariana, il–05, p1.1–03,
Gomez-Flores Ricardo, p2.78–07,
Güneş M., o5–02, o5–03, o5–06,
Gusheski, D., o1–04,

H

Hadzi-Nikolova, M., o1–03, o1–06,
Hajrulai-Musliu, Z., o1–10,
Haliti-Baruti B. p2.5–03,
Harcota, George Emanuel, p2.6–02,
p2.6–04,
Hazar D., o2–08, o2–10,
Heredia-Rodríguez Omar, p2.78–07,
Heredia-Rojas, J. Antonio, p2.78–04,
Hiseni Driton, p2.6–07,
Hristovski N., p2.78–10,
Hyseni D., o5–12,

I

Igić M., o5–17,
 Iliev, A., o2–02,
 İlknur Ünüvar F., o5–16,
 İlseven Serkan, p2.78–08,
 Iordanov Jechko, o5–14, p1.3–08,
 Iosub M., o3–06,
 Ismaili Murtezan, p1.1–04, p1.1–05,
 Ivana I., p1.1–09,
 Ivanov Mihajlo, o5–09,
 Ivanovski Filip, p2.5–01, o6–01, o6–05,

J

Jakimovska K., p2.78–01,
 Janackovic, G., o1–07, o1–08,
 Janeva A., p2.78–03,
 Janevski Jordan, o1–01,
 Janic Milorad, p2.6–01,
 Jankulovska M., p1.1–02,
 Jitariu D., o2–09,
 Joleska-Bureska Lidija, p2.6–05,
 Jovančićević B., p1.1–03,
 Jovanovski V., p2.5–05,
 Jovtchev G., p1.3–02, p1.3–03,
 Judy F., o2–07,
 Jufa, A. C., p2.78–13,

K

Kalinkin Aleksander, p1.3–05,
 Kandikjan, T., o2–03, o2–05, p1.3–07,
 Karatoteva D., o4–10,
 Kart Aktas N., o5–11, o2–17,
 Keci E., p1.1–08,
 Kelmendi M., p2.5–03,
 Ketin S., o2–12,
 Kicaj H., p1.1–08,
 Kilova K. p2.78–03,,
 Kiourtidou D. N., p2.6–06,
 Kiteva-Rogleva, N., o2–02,
 Kochubovski Mihail, s1–01, p1.1–02,
 Kokkinakis, A. K., p1.4–03, p2.6–06
 Kolitari J., p2.78–06,
 Kostic B., o2–12,

Kostić Miloš, p2.78–12,
 Kostov Vl., p2.2–02,
 Kostova B., p1.3–05, p2.2–02,
 Krasniqi Drenusha, p2.6–07,
 Krasniqi Marigona, p2.6–07,
 Krstanoski, M., p2.78–01,
 Krstić Dejan, o3–01,
 Kurteshi K., p1.3–06,
 Kurucu Y. o2–07, o4–02, o4–08,

L

Laks, M., s1–04,
 Lazareviki Marija, o5–13,
 Lazarevska, A. M., o2–05, o5–18, p1.3–07,
 Lazarevska, Ana M., o2–06, p2.78–01
 Lazo P., p1.1–01,
 Leontaris Fokion, o3–05,
 Liçi Lorina, o6–03,
 Liyanage, Kapila, o2–01,
 Llupa Jonilda, o6–03,

M

Macocian, E.-V., p2.78–13,
 Malenović,-Nikolić J., s1–08, s1–07,
 Malenović-Nikolić Jelena, o3–01,
 Malinova L., o4–10,
 Malinovic, B. N., p1.1–07,
 Malollari Ilirjan, o4–11, o6–03, p2.5–03,
 Mangaroska V., o5–04,
 Mangaroski K. o5–04,
 Markic, D. N., p1.1–07,
 Markov Zoran, o2–06, o5–13, p1.3–09,
 Massaldjjeva R., p2.78–03,
 Mateescu Razvan, il–05,
 Matevski V., o5–19,
 Maznevskaa, A. K., o6–01,
 Medenica M., p2.2–01,
 Mesić Milan, o4–01,
 Metcheva Roumiana, p2.78–04, p2.78–07,
 Mihajlovic E., p2.2–01,
 Milisavljevic B. o3–07,

Index of authors

Milosevic L., p2.2–01,
Mirakovski, D., o1–03, o1–06,
Miteva K., o6–07, p2.5–04,
Mitevska Maja, o2–06,
Mitković M., o5–17, o5–17,
Mitkovski Toni, p2.5–01,
Mitrova S., o3–09,
Mitrović Jelena, p2.78–12,
Mladenovska D., p1.3–07, p2.78–01,
Mladenovski G., o6–04, p2.5–02,
Mojsovski Filip, o4–09,
Moldovan M., p2.78–02,
Morina R., p2.5–06,
Motelică, D. M., p1.1–09,
Muja Nesade, p2.6–11,

N

Najdanović Slobodan, p2.78–12,
Naumovski V., o6–05,
Nenciu Magda Ioana, il–05, , p2.6–04,
p2.6–02, p2.6–08, p2.6–09, p2.6–10,
p2.78–05,
Nicusor Boja, p1.4–10,
Nikolic Vesna, p2.6–01,
Nikolova N., p1.3–03,
Nikolova-Poceva, S., o2–02,
Nikolovski C., o5–08,
Nistor Razvan, p1.3–13,

O

Olhan E. o4–03, o4–04,
Oprea, O. B., p2.78–13,
Oprışan O., o2–09,
Oros Andra, p2.78–05,
Ozcam Z., o2–10, o5–10,
Özçelik A. p1.4–07, o5–15,
Ozimec S., p1.3–04,
Ozkan, S. P., o3–02,
Özyavuz M., o5–03, o5–06,

P

Pahsaliska-Andonovska J., o5–08,
Palceski Spase, o6–06,
Palevic, M. o3–07,

Panait, D. E., p2.78–13,
Papaliangas T., p2.2–02,
Paparisto A., p1.1–08,
Pascu, A. M., p2.78–13,
Paskaleva Iv., p2.2–02,
Patriche Neculai, p2.6–09,
Pavloski Igor, o6–06,
Pelovski Y., o5–14, o6–02, o6–08, p1.3–
05, p1.3–10, p2.2–02, p2.78–09,
Pencic Divna, o5–01,
Pepa B., p1.1–08,
Perčin Aleksandra, o4–01,
Petkova V., o6–02, o6–08, p1.3–05, p1.3–
10, p2.2–02, p2.78–09,
Petrova K., o4–10,
Petrović Sanja, o2–15,
Pinguli Luljeta, o6–03,
Pop M., p1.4–04,
Popa D., p2.78–02,
Popa M., p2.78–02, p2.78–13,
Popa, A. I., p1.3–14,
Popov Nikolay, p2.78–04,
Preda M., p1.1–09, p1.4–05,
Prlić D., p1.3–04,
Prodan D., p2.78–02,

Q

Qarri F., p1.1–01,
Quaranta G. , o2–11,

R

Radović Miljana, p2.78–12,
Radu Gheorge, p2.6–02,
Radu Gheorghe, p2.6–04, p2.6–08,
Radu Gheorghe, p2.6–09, p2.6–10,
Ramshaj Q., p1.3–06,
Rapajic B., o3–07,
Ravnachka I., p1.3–03,
Redi Buzo, o6–03,
Rexhepi Festim, p1.4–06,
Rikaloski Ice, o6–06,
Robescu, V. O., o2–09,
Rodríguez de la Fuente, Abraham O.,
p2.78–07, p2.78–04,

Rodríguez-Flores Laura E., p2.78–07,
p2.78–04,
Romanescu Gh., o3–06,
Rushan Ceka, p1.1–05,
Rusu E., p1.4–02,

S

Sadikaj R., o4–11,
Sadiku M., p2.5–03,
Şahin S., o5–02,
Şahinli, M. A., o5–15, p1.4–07,
Şajn, R., s1–05,
Saliu Flamur, p1.1–05,
Sallaku F. p2.5–06,
Salvia R., o2–11,
Sapuric Z., o6–01, o6–05, p2.5–01,
Sbarcea M., o5–07,
Selim I., p1.3–07, I., o2–05,
Šelmić-Milosavljevic Nataša, o3–01,
Şenol Fatma, o3–02, o3–03,
Serafimova E., o5–14, o6–02, o6–08,
p1.3–08, p2.78–09, p1.3–05, p1.3–10,
Serbinovski Mile, p1.1–05,
Šestak Ivana, o4–01,
Shabani, B., o2–04,
Shesho I., p1.3–09,
Shushlevska M., o5–08,
Shyqeriu M., o4–11,
Sijakova, T., s1–03,
Sirbu Gheorghe, p2.6–08,
Smiljkov S., p2.78–10,
Sofronidis, K., p1.4–03,
Sotirovska-Ivkovska A., p1.1–02,
Spaho E., o4–11,
Spalević Velibor, o3–07, p2.6–01,
Spalevic, Z. o3–07,
Spînu Alina Daiana, il–05,
Stafilov T.,
Stafilov Trajče, il–03, o1–05, o5–19, p1.1–
01, p2.5–05,
Stamenkova A., p1.1–02,
Stanimirović B., p1.1–03,
Stankov A., p1.3–02, p1.3–03,

Stankovic, S., s1–07,
Stanojević Jelena, o2–13, o2–14, o2–15,
Stanojević Katarina, o2–14,
Stanojević Ljiljana, o2–13, o2–14, o2–15,
p1.3–11,
Stefanovski, D. s1–04,
Stefov V., p2.5–05,
Stelian Borz, p1.4–10,
Stevanović Marija, o2–15,
Stojadinović S., p1.1–03,
Stojanovska,-Dimzoska B., s1–10,
Stojanovski S., p2.78–10,
Stoleriu C. C., o3–06,
Stoyanov V., o6–08, p1.3–05, p1.3–10,
p2.2–02,

T

Tănase V., p1.1–09, p1.4–05,
Taraj Krenaida, o6–03,
Tashevski Done, o5–12, p2.6–07, p1.3–
09,
Teodorova, Svetla E., p2.78–04,
Testoni Raffaella, il–01,
Tezcan-Yildirim Hasn, o4–07,
Thaçi, Bashkim, o1–11,
Tiganov George, p2.78–05,
Tileaga C. o2–09,
Timofte Florin, p2.6–02, p2.6–04,
Tiron-Tudor Adriana, p1.3–13,
Todorović Zoran, o2–13, o2–14, p1.3–11,
Todorovska G. p1.1–02,
Topashka-Ancheva Margarita, p2.78–04,
Totoiu Aurelia, p2.6–02, p2.6–04, p2.6–
08, p2.6–09, p2.6–10, p2.78–05,
Trajanoska B., p2.78–11,
Trajkov Stefan, o2–16,
Trifunović Nikola, o3–01,
Troter Dragan, o2–13, o2–14, p1.3–11,
Tsiaras S. o4–05, p1.4–08,
Tudor M., o5–07,
Türkmen S., o4–06,
Tzvetanova Y., p1.3–05,

Index of authors

U

Uka Kujtim, p1.4–06,

V

Varsta A, p2.78–02,
Varvara S., p2.78–02,
Vasovic, D., s1–07, s1–08, s1–09,
Velibeyoglu K. o2–08,
Velickova Nevenla o3–04,
Velinov Nena, p2.78–12,
Veljković Vlada, o2–13, p1.3–11,
Velkova-Jordanovska L., p2.78–10,
Veselaj T., p2.5–06,
Vlasceanu Elena, il–05,
Volkanoski S. o6–04, p2.5–02,
Vranjanac, Z., s1–07, s1–08, s1–09,
Vrînceanu N., p1.4–05,
Vrînceanu, N. O., p1.1–09,
Vucic V., p1.3–12,

W

Wood Richard, o2–06,

X

Xanthos Stelios, o3–05,,

Y

Yanev Ruslan p1.3–08,,
Yıldız N. o2–17,
Yurdakul-Erol Seçil, o4–07,

Z

Zaharia Tania, il–05,
Zanbak Caner, il–04,
Zendeli Gjulten, s1–01,
Zendelska, A., s1–03, s1–06,
Zeneli K., p1.1–06,
Zeybek Hasan, o5–05,
Zgorelec Željka, o4–01,
Zhushi-Etemi Ferdije, p1.1–04, p2.6–11,
Zigar Darko, o3–01,
Živković, N., s1–09,
Zucchetti Massimo, il–01,
Zvereva Irina, p1.3–05,
Zvezdanović Jelena, o2–15,

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СКОПЈЕ



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