

ACHIEVING OF ENVIRONMENTAL SAFETY THROUGH EDUCATION OF MODERN ORIENTED SOCIETY

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ABSTRACT

The article brings an assessment of the significance of environmental education of modern oriented society as one of the means of ensuring protection of the environment. Environmental education is continually gaining importance due to the newly emerging environmental issues in society, particularly those with severe impacts. One of the main goals of this article is to consider and define the environmental safety. Subsequently the article discusses the importance of education in this field as well as classifies ongoing forms of study programmes in particular stages of the educational structures in the Slovak Republic.

Keywords: environmental safety, environmental education, the environment.

AN EVALUATION MATRIX FOR ECOTOURISM POTENTIAL IN CERTAIN CATEGORIES OF PROTECTED AREAS IN ROMANIA. CASE STUDIES: NATIONAL PARK, NATURE PARK, GEOPARK

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ABSTRACT

The ecotourism potential's evaluation of protected areas defines one main management objective for interested administrations, thus allowing the production of certain tools of intervention for the benefit of species and habitat protection, especially considering those of community interest, as well as for the guidance of educational activities and tourist inflows. According to IUCN, a protected area beholds the purpose of long term nature conservation, of environmental services and associated cultural values. The Romanian legislation (Law 49/2011) includes elaborated directions of intervention, particularly: protection of plants and animals, of bio-geographical formations, of landscape, geo-diversity, paleontological formations, caves or other structures, having a significant ecological, scientific or cultural value. The evaluation matrix of ecotourism potential depicts an intricate picture that allows the quantification of those elements which are required for protection, as well as those particularized in the Romanian legislations. They were grouped in two main categories: those associated with the natural heritage and those belonging to the cultural heritage. Each of them includes subcategories that are prioritized according to: attraction, accessibility, representation and uniqueness. In order to exemplify this matrix we selected three categories of protected areas which are located in south-western Romania, precisely: Domogled-Cerna Valley National Park (DCVNP), "Iron Gates" Nature Park (IGNP) and Mehedinți Plateau Geopark (MPG). The entire surface covered by these three protected areas - having joint boundaries - is of 176,972.5 ha, representing 0.74% of Romania's territory. These are altogether part of Nature 2000 network and, beyond the community value of habitats and species, they stand out through natural landscape heritage values and unique cultural attributes that reflect the ethnical, historical and cultural diversity of the places they occupy or of surrounding spaces. This matrix could be reasoned as an analysis tool for other protected areas located on Romania's territory.

Keywords: evaluation matrix, ecotourism potential, protected areas, strategies in ecotourism, Romania

ANALYSIS OF IMPLEMENTING SUSTAINABLE MUNICIPAL SOLID WASTE MANAGEMENT. KRAKOW CITY CASE STUDY

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ABSTRACT

In the second half of the twentieth century the problems related to waste disposal have become a serious civilization challenge. Economic and technical development led to increased production of waste. The most important objective of the Waste Framework Directive (Directive 2008/98/EC on waste) is to break the link between economic growth and waste generation. The principles of sustainable development and the European Union regulations for sustainable waste management are the main guidelines for municipal waste management policy in Poland. According to the Directive, sustainable treatment of waste must follow the hierarchy which is listed in order of priority: prevention, preparing for reuse, recycling, other recovery e.g. energy recovery and disposal. A number of reforms were introduced in Poland according to the EU guidelines. New regulations organizing a new waste management system in the country were introduced in 2013. The local governments were responsible for the implementation of the new policy. Also, the local government of the city of Krakow had to reform municipal waste management. The paper presents issues related to the municipal waste management in Krakow. Analysis presented in the article shows municipal waste collection system and main installations for the waste management and processing. Installations for composting biodegradable waste, segregation of recyclable materials, alternative fuel processing and waste storage in the landfill are described as well as the municipal waste incineration plant - the largest of the investments in the municipal waste management.

Keywords: sustainable waste management, municipal waste, Krakow, recycling, waste processing

ANTIMONY CONTENT IN TOPSOILS AROUND A LEAD AND ZINC MINING AND SMELTING AREA IN MITROVICA, REPUBLIC OF KOSOVA

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ABSTRACT

A study on the effects of lead and zinc mining and smelting activities on soil environment in and around Mitrovica area, one the largest and richest mining district in the Republic of Kosova was carried out. The levels of antimony were determined in the 156 soil samples (depth 0-5 cm) using mass spectrometry with inductively coupled plasma (ICP-MS). The average Sb level in the soil for the entire investigated area (301.5 square kilometres) amounted to 2.3 ppm with a range from 0.10 to 1506 ppm. The highest content of Sb was found in the urban soils taken in the town of Zvečan, (ranged from 80.1 to 1506 ppm) and average value of 190 ppm exceeds the European average value for 316 times; in urban soils taken in the city of Mitrovica the Sb average value of 7.9 ppm (and the ranges from 18.1 to 27.4 ppm) exceeds the European average value for 13 times. Relatively high content of Sb ranging from 1.3 to 9.9 ppm were also found in soils taken around the “Trepca” mine in Stan Terg and in alluvial plains of the Sitnica River (ranges from 0.9 to 25 ppm). There was a zone of 102.5 km² contaminated with Sb high level (above 3 ppm), while in southern part of the investigated area (city of Vushtrri) soils are less affected with potentially emission sources of Sb. This indicates that the concentration of Sb in the investigated soils is of anthropogenic origin and not natural. There is evidence showing that spatial distribution of Sb in contaminated soils is similar to As with which it is often associated in nonferrous ores. It can be concluded that long-term of the lead and zinc mining and smelting activities was the cause for the soil contamination with Sb in this area.

Keywords: Antimony, soil, Pb/Zn mining and smelting, pollution, Mitrovica, Republic of Kosova

APPLICATION OF NATURAL CLINOPTILOLITE FOR HEAVY METALS REDUCING IN WATERS

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ABSTRACT

Various trace elements such as Cu, Ni, Zn, Se are essential to life, but only at trace levels. In larger quantities they can be hazardous for the living organisms. Waste waters produced from various manufacturing operations contain these elements in quantities exceeding the maximum allowable concentrations. The application of traditional methods of waste water treatment is expensive and produces more pollutants that are adversely affecting the environment. Therefore the alternative methods for heavy metals removal in waste waters are searched. Current research is focused on the application of the natural materials that could be highly affordable sorbents, such is natural zeolite. The sorption of copper and nickel salts solutions was studied on the samples of natural zeolite - clinoptilolite with different grain sizes, where the efficiency up to 78.9 percent was reached with respect to sorption of copper cations. The results indicate the possibility of the natural zeolite use for sorption of toxic substances in various applications.

Keywords: waste waters, copper, environment, zeolite, clinoptilolite

APPLICATION OF VARIOUS METHODS FOR SULPHATES REMOVAL UNDER ACIDIC CONDITIONS

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ABSTRACT

The occurrence of acid mine drainage is usually associated with mining activities. Acid mine drainage usually due to low pH (3-4) contains high concentrations of sulphates and heavy metals, and because of water pollution and devastation of the country can cause serious environmental problems. Depending on the hydrological characteristics of the region, it may affect a much larger area and can cause the deterioration of the quality parameters of surface and groundwater and the consequent threat to human health.

According to Directive 2000/60/EC of the European Parliament it is necessary to ensure adequate water quality and protection of all water sources. In Slovak Republic, as the country with long mining traditions, now exist a few localities with existing acid mine drainage generation conditions (either in form of direct outflow from mine or leachate from tailing ponds). Low pH of these waters is limiting for many various treatment technologies and must be taken into consideration in the research of potential methods for acid mine drainage treatment.

The presented paper deals with the utilisation of different substances for sulphates removal from model acidic solutions that imitate the conditions of acid mine drainage. Results of sorption experiments with surface modified silica and also precipitation using barium chloride and Portland cement are presented.

Keywords: sulphates, acidic solutions, sorption, precipitation

ASPECTS FOR EFFECTIVE DESIGN SEWAGE NETWORK

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ABSTRACT

Paper is focused to compare aspects of affecting proposal of sewage network with flat terrain and sloping terrain. Influence of the sloping of is for design an important input, which affects not only the proposal of sewage network but also effects of operating conditions In sloping terrain are the main problems velocities in the sewers, the speed of surface runoff into sewer network and rainfall runoff itself. If is the proposal of sewage network on a flat terrain problem occurs in bad conditions of wastewater transport due to insufficient of suitable slopes. These aspects are then reflected in the economic requirements for the construction and operation of the sewerage network. The aim of the article is to compare the parameters of the proposal selected countries in relation standards used in Central Europe.

Keywords: sewage network, design, flow velocity, slope, filling height

ASPIRING GEOPARK RIO COCO (NICARAGUA)

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ABSTRACT

The contribution deals with the preparation of Rio Coco Geopark which runs already more than decade. The area is located in Northwest Nicaragua close to the Honduras border and it includes except of extraordinary geological and geomorphologic phenomena also archaeological and other landscape heritage with a high potential for sustainable tourism. This geological and other natural heritage as well as local indigenous culture is described as a fundamental capital of the geopark aspiring to the Global Geopark Network assisted by UNESCO. It focuses on the role of local people in the geotourism management and interpretation.

The unique geological phenomenon lies in the center of the area; it is deep gorge where Río Coco cuts the Tertiary ignimbrites. Until 2004, this unique geosite was known and visited only by local people. In March 2004, Czech geologists discovered it for the rest of the world as they carried out their terrain research there. This fieldwork has been done in the frame of a Czech Foreign Assistance Programme supported by the Czech Ministry of the Environment and undertaken by the Czech Geological Survey in cooperation with Nicaraguan Institute of the Territorial Studies. During the last decade, the area of the canyon and its surroundings has become well known to local and foreign visitors. The popularity of the area is contributing to the economic development of the Rio Coco region but it must be managed in sustainable way. For this reason, the local and central government authorities, together with specialists from Ministry of Environment of Czech Republic and Czech Geological Survey have collaborated on the preparation of a application for Rio Coco Global Geopark.

Authors presume that the quantitative and qualitative level of involvement of the local and mainly indigenous people (Chorotega) with their traditional know-how, skills and life style will correlate positively with environmental, economic and social sustainability of this naturally and culturally distinctive region. It means that the creation of the UNESCO assisted geopark represents a great potential for protection of local natural and cultural heritage, for regional development based on geotourism, ecological agriculture, artistic handicrafts, local cuisine and before all for support of indigenous culture and identity in general.

Keywords: geopark, geological heritage, geotourism, Rio Coco, indigenous people

**ASSESSMENT OF QUALITY OF WATERS OF THE CUT BEND
OF THE RIVER OF KAZANKI (BIOTESTING METHOD)**

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ABSTRACT

Now the composition of natural waters of reservoirs is substantially formed under the influence of anthropogenous loading. In the conditions of an urbanization of territories especially important there is a preservation of the water objects which are an element of a city landscape and environment. Diverse polluting substances, getting to environment, can undergo in it various changes, strengthening thus toxic action. And the problem of quality of water, certainly, is one of actual environmental problems.

Keywords: bioindication, acute toxicity, natural waters, sewage, test objects, environmental monitoring, chemical pollution

**ASSESSMENT OF THE FOREST SHELTERBELTS EFFECT ON LOCAL
DYNAMICS OF SNOW LAYER, SOIL MOISTURE AND AGRICULTURAL
CROP YIELDS AS A SECOND PROTECTIVE FUNCTION**

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ABSTRACT

In the south of Romania many forest shelterbelts were established at the middle of last century to protect agricultural crops, railways and roads. Unfortunately, during time, almost all of them were cut down. Few shelterbelts were identified in the Teleorman County (south of Romania) and studied in order to outline that they are protecting roads and railways as main function and they have also a secondary role - protection of agricultural crops. Soil moisture, snow level and the yield of crops were measured on the area protected by shelterbelts. The influence of forest shelterbelts on soil humidity was correlated with the growth of agricultural crops. Positive effects of shelterbelts which protect the roads and railways were emphasized in case of wheat and sunflower crops.

Keywords: forest shelterbelts, protected area, agricultural crops, roads, railways

AZORES GEOPARK: THE CHALLENGE OF MANAGING AN ARCHIPELAGIC GEOPARK

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ABSTRACT

The Azores archipelago, located in the North Atlantic Ocean, is formed by nine islands, several islets and the surrounding seafloor. Despite the small terrestrial area of the archipelago (2332 sq. km), the Azores geodiversity represents elements closely linked to the dynamics of planet Earth, in particular, the volcanism and geotectonic of this region of the planet, making this archipelago a natural laboratory of volcanic geodiversity.

The Azores Geopark was the first arquipelagic territory integrated in the European and Global Geoparks Networks, in march 2013. It is based on a decentralized management structure with support in all the islands, and in a network of 121 geosites spread all over the nine islands and the surrounding seafloor, that: i) ensures the representativeness of the geodiversity that characterizes the Azorean territory, ii) reflects its geological and eruptive history, and iii) has common strategies of conservation and promotion.

The international and national relevance of the geological heritage of the territory, its scientific, educational and geotouristic interests and, simultaneously, the existence of a rich biodiversity and a remarkable cultural and intangible heritage, are the foundations for the implementation in the territory of sustainable development policies, strongly supported in environmental protection strategies, and in geoconservation in particular.

This holistic and integrative view improve synergies and serve as an additional incentive to all involved in the geopark.

With the motto “9 islands – 1 Geopark”, the Azores Geopark main challenge is to manage on a sustainable way all this 9 insular parts of its territory.

So, to achieve the main goals of the geopark, the established partnerships with public and private entities are crucial, giving the opportunity to reach to a major public in all the islands and through different activities.

Keywords: Azores Geopark, management, archipelago, synergies, partnerships

BEHAVIORAL RESPONSE OF DAPHNIA MAGNA (CRUSTACEA, CLADOCERA) TO LOW CONCENTRATION OF MICROCYSTIN

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ABSTRACT

In this paper, the effect of low concentration ($0.15 \mu\text{g L}^{-1}$) of cyanobacterial toxin – microcystin-LR on *Daphnia magna* laboratory clones was investigated. Swimming activity (median swimming speed) and spatial distribution of the daphnids were determined and analyzed in real time by the authors developed a hardware-software system “TrackTox”. The system performs the identification and tracking of the test organisms using computer vision algorithms. The behavioral response of the daphnids was studied under normal conditions and after application of microcystin-LR. In both cases exposure time was 30 minutes, the data were counted 5 times s^{-1} . It is shown that the addition of microcystin significantly increased median swimming speed of the *Daphnia magna* ($P=0.01$). After the behavior experiments observation of the survival of daphnids in the same solutions was conducted. Daphnids mortality after 48 hours exposure to the $0.15 \mu\text{g L}^{-1}$ concentration of microcystin-LR is not registered.

Keywords: *Daphnia magna*, behavioral response, microcystin-LR, toxicity, computer vision.

**BEST AVAILABLE TECHNIQUES IN CERAMIC INDUSTRY:
ENHANCING ENVIRONMENTAL PERFORMANCE AND IMPROVING
ENERGY EFFICIENCY**

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ABSTRACT

Opportunities for introducing Best Available Techniques in Russian ceramic manufacturing sector are considered using examples of industries producing ceramic tiles and bricks. Results of the comparative study of current emission and consumption levels are discussed. National Standards developed by the authors for the production of bricks and tiles are presented as analogs of the European Conclusions on Best Available Techniques.

Keywords: Best Available Techniques, Ceramic Industry, Energy and Resource Efficiency, Environmental Performance.

BEST PRACTICE IN ENVIRONMENTAL IMPACT EVALUATION BASED ON LCA – METHODOLOGIES REVIEW

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ABSTRACT

Life-cycle assessment is a technique to assess environmental impacts associated with all the stages of a product's life from-cradle-to-grave - from raw material extraction through materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling. It is fairly new approach, but till now many methodologies and tools have been developed on the basis of LCA. They usually compile an inventory of relevant energy and material inputs and environmental releases, evaluate the potential impacts associated with identified inputs and releases and finally they could be used to interpret the results in order to help decision makers to make a more informed decision.

Different types of methodologies are discussed in the manuscript. Generally they could be divided into different types like midpoint impact assessment methods with or without normalization and weighting or endpoint impact assessment methods as well as mixed type ones. Methodologies BEES, CML 2002, ECO-INDICATOR 99, IMPACT 2002+, TRACI 2, AUSLCI, RECIPE are reviewed. Different evaluating impact categories, criteria for their selecting and general methodological structure is discussed in the manuscript as well.

Keywords: environmental impact, methodology, LCA

BIOSORPTION OF COPPER BY EGGSHELL FROM AQUEOUS SOLUTIONS**Ing. Stefan Sabo¹****Assoc-Prof. Tomas Bakalar¹****Assoc-Prof. Milan Bugel¹****Assist-Prof. Henrieta Pavolova²**

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ABSTRACT

Biosorption of Cu(II) ions from aqueous solutions has been studied and the adsorption capacity of eggshell has been determined. The experimental data obtained from batch equilibrium tests have been analysed by two- and three-parameter isotherm models (Freundlich, Langmuir, Redlich-Peterson) and the data obtained from kinetics experiments have been analysed by the model of Urano-Tachikawa. The eggshell was cleaned and dried at room temperature. The material was washed and oven dried at 50°C for 72 hours. The shell was ground and sieved under 71 µm of particle size. The suspensions of eggshell were treated to reach the pH of 6. The equilibrium experiments were carried out by varying concentrations of initial Cu(II) solution. In all experiments, the flasks were shaken on orbital shaker at 200 rpm and at 25°C for 6 hours to ensure ion-exchange equilibrium. The suspensions were then filtered through a micro filter of pore size 0.8 µm and filtrates were analysed using flame AAS in order to determine the final Cu(II) concentration in solution. The kinetics experiments were performed with initial metal concentrations 100 mg/L. The aqueous samples were taken at different time intervals (1-90 min) and then filtered through a micro filter. The concentration of biosorbent was 0.1 g/L. According to the results of the experiments the adsorption equilibrium of Cu(II) on eggshell was best described by Freundlich and Redlich-Peterson isotherms (almost identically). The maximum sorption capacity was 100 mg/g. The effective diffusion coefficient was in the order of magnitude 10^{-18} m²/s estimated by the model of Urano-Tachikawa. The kinetics of adsorption is fast. The Cu(II) concentration decreased markedly during the first 2-3 minutes. The actual concentration decreased from 103 mg/L to 16, 19, and 18 mg/L at 150, 250, and 350 rpm, respectively, after ten minutes. Further on the Cu(II) concentration did not change significantly with time. The experimental results of this study demonstrate that eggshell is suitable for adsorption of copper from aqueous solutions at low concentrations.

Keywords: biosorption, eggshell, copper, equilibrium, kinetics

CARTOGRAPHY AND GIS APPROACH TO THE ENVIRONMENTAL ASSESSMENT IN THE REGION OF THE OIL INDUSTRY

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ABSTRACT

The given paper considers the methodological aspects of the Atlas mapping for the purposes of Sustainable Development in the regions of Russia. The Republic of Tatarstan viewed as a model territory where a large-scale oil-gas complex "Tatneft" PLC works. Methods for to the structure and requirements for the Atlas's content were outlined. The approaches to mapping of "an ecological dominant" of Sustainable Development (SD) conceptually substantiated following the pattern of a large region of Russia. The Atlas proposed to be developed, can be considered by its spatial scope as the regional one and by the content as the fundamental complex science-reference mapping guide which characterizes the environment situation in the east of Tatarstan, the conditions and factors that determine it, the tendencies to the change of the ecological state in the territory and in the centers, the measures to reach an ecological equilibrium.

The methods of mathematical-mapping and computer modeling presume to compute spatial correlations and mutual conformity of phenomena and to estimate the homogeneity of the ecological conditions, to reveal the leading factors of distribution and phenomena and processes development using the means of multidimensional statistical analysis.

Keywords: Sustainable Development, Atlas, mapping, Environmental Assessment, geographic information systems, Oil-gas complex.

CFD ANALYSIS OF A PERPENDICULAR INFLOW INLET ZONE IN A WASTE WATER SETTLING TANK

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ABSTRACT

The goal of this paper is the analysis of a primary settling tank at the waste water treatment plant in Humenné, SK. The analysis is performed with the use of a mathematical model from the ANSYS CFD software package, ANSYS Fluent. The article discusses hydraulic problems in the inlet zone of the settling tank, which are caused by the specific shape of inlet zone for the perpendicular wastewater inflow. Several states of the settling tank were calculated to simulate different shapes of the inlets, and analyses possible solutions to these problems.

Keywords: CFD, Settling Tank, Inflow, Waste water

COMPARATIVE EVALUATION OF ABSORPTION CAPACITY FOR SOME HEAVY METALS BY TWO ARBOREAL LICHENS SPECIES GROWING ON SPRUCE AT DIFFERENT ALTITUDE IN BUCEGI MOUNTAINS

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ABSTRACT

This work is about the characteristics of absorption and storage of some heavy metals by two arboreal lichens species which are dominant on spruce bark in National Park Bucegi area, at different altitude. The great problem is that the spruce exemplars massively covered by dominant lichens thallus are drying in time. The main task of our work is to find any correlation between accumulation of heavy metal species, lichen species and altitude. So, were taken in study two dominant epiphyte lichens species *Evernia divaricata* and *Parmelia tubulosa*. *Evernia divaricata* could be found at four altitude, 900 m, 1200 m, 1500 m and 1800 m developing a great quantity of biomass, covering massively the bark of many spruce exemplars and *Parmelia tubulosa* was found only from 1200 m to 1800 m altitude.

Lichens thallus and spruce bark were analyzed by Energy Dispersive X-Ray spectrometry. The results are calculated in ppm, the sensitivity of EDXRF method is of 1 ppm. By this method were determinate iron, titanium, nickel, chromium, copper, zinc, manganese, strontium and lead. For every result were considered minimum 3 and maximum 5 samples of thallus or spruce bark for each altitude and each arboreal lichens species, from case to case.

The analysis show that the highest metal content in thallus was for iron comparatively with the other heavy metals determined, in all samples at both lichens species studied, no matter the altitude. Iron content in *Evernia divaricata* thallus was between a minimum of 162.97 ppm in samples collected from 1200 m altitude and maximum of 650.60 ppm in those harvested from 1500 m altitude. In case of samples of *Parmelia tubulosa* iron content was between a minimum of 266.603 ppm in thallus collected from 1500 m altitude and a maximum of 1711.54 ppm in samples harvested from 1800 m altitude. Titanium, nickel, chromium, copper, zinc, strontium and lead were found in concentrations significant lower compared to iron in all analyzed samples.

Each heavy metal species determined were absorbed by lichens thallus in different quantities from a lichen species to other and from one altitude to another. It will be presented in this work the bioaccumulation factor of *Evernia divaricata* and *Parmelia tubulosa* for each heavy metal and for each altitude.

Keywords: epiphytic lichens, dominant species, spruce, bioaccumulation, heavy metals.

COMPARING OF SULPHATES REMOVING FROM REAL MINE WATER AND MODEL SOLUTION USING BARIUM SALTS

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ABSTRACT

Smolník is a mining area in Slovakia with a very serious impact of mining activities on the environment. The mine is known from the 13th century by producing copper, iron, silver and gold. The mine was closed in the 90s of the 20th century. More than 6 million tons of pyrite ores of various qualities have been abandoned in the mine. The water quality of the Smolník stream dramatically decreased a short time after the closing of the mine. Smolník stream is classified as one of the more contaminated in Slovakia, especially in sulphate amount and pH values. This is the reason for searching this problem. It is common knowledge that barium is a suitable reagent for sulphate reducing. The paper deals with sulphate removing from model solution using BaCO_3 and Ba(OH)_2 at various pH values and also sulphate removing from real mine water from the old mine Smolník using the same Ba reagents. Summary of paper describes optimal pH value and optimal amount of Ba reagent per 1 liter and duration of interaction reagent with water for reaching allowable values of sulphates in the water.

Keywords: AMD, desulphatation, precipitation, barium, neutralisation,

COMPARISON OF THE UPTAKE ^{133}Cs IN SUNFLOWERS AND REEDS FROM THREE DIFFERENT SOIL TYPES (PEAT, HUMUS AND CLAY)

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ABSTRACT

Radionuclides enter into the many ecosystems, although their presence in organisms is not required. Due to radiation the quality of life of various organisms decrease. Radionuclides belonging to the anthropogenic group are mainly coming from the used nuclear fuel as ^{90}Sr , ^{131}I , ^{137}Cs . This last one (^{137}Cs) has a nonradioactive isotope occurring in a small amount in nature. This nonradioactive isotope ^{133}Cs was used in our experiment because there is no difference in uptake of stable and radioactive elements by plants. Anthropogenic radionuclides and their occurrence could be expected near atomic plants, during normal operations in a small amount and during an accident in a significant amount.

In our study we compared uptake of ^{133}Cs by plants cultivated in three different soil types: peat, humus and clay. The selection of plant species was based according to those found in the area around the nuclear power plant in Temelín – *Helianthus annuus* L. and *Phragmites australis*. These plants were cultivated in greenhouses in pots with regular irrigation. The solution of 1/4 Hoagland was used as a fertilizer. Plants were exposed to Cs, added in the form of CsCl, for 20 days. All samples were analysed with ICP-MS. The pH and the content of organic carbon were measured in the soil.

Our results show higher accumulation of ^{133}Cs in *Helianthus annuus* L. cultivated on all mentioned soil types. The highest accumulation was observed in plants cultivated in peat soil.

Keywords: phytoremediation, stable isotope, earth, annual plant, perennial plant

CONSTRUCTION OF THE GEOTOURISM PRODUCT STRUCTURE ON THE EXAMPLE OF POLAND

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ABSTRACT

This article is an attempt to define the geotourism product, which was created based on the definitions of geotourism, product, tourism product and geo-product. Classification of geo-products was made based on selected examples from Poland. The geotourism product structure was constructed, and its levels were thoroughly analysed.

Keywords: theory of tourism, geotourism product, geodiversity, Poland

**CONTENTS OF CADMIUM, COPPER AND LEAD IN PLANT BIOMASS
WITHIN FORMER URANIUM PROCESSING PLANT AREA MAPE, CZECH
REPUBLIC, MYDLOVARY**

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ABSTRACT

MAPE area is located near Mydlovary settlement, Southern Bohemia. It is known as a former uranium ore processing plant, which was running during 1962–1991. Currently, this area represents a major ecological issue. Study area is located within the emergency zone of nuclear power plant Temelin.

Since uranium processing plant had shut down, continuous remediation and recultivation work took place. During 1991–2010 plant biomass was sampled regularly. Harvested biomass was analyzed for presence of Cd, Cu and Pb. At the same time a biomass from reference area 8 kilometers away was sampled. Data were processed using Prism statistical software through linear regression method. A significant decrease in Cd and Cu concentrations was measured during analyzed seasons. On the contrary, no trend in Pb concentrations had shown.

Keywords: plant biomass, cadmium, copper, lead, MAPE, Czech Republic

**DESTINATION IDENTITY – STARTING POINT IN CONSTRUCTING
CULTURAL ECOTOURISM PRODUCTS. CASE STUDY: YOUNG PEOPLE’S
OPINIONS REGARDING ȚARA HAȚEGULUI**

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ABSTRACT

The current universal trends attest the increased importance given to the measures of protection and effective management of natural and cultural heritage, and therefore, a propensity of potential tourists to assign a greater relative importance to the attributes regarding the responsibility for nature and culture, as ecotourism development premises. The task of marketing specialists is, therefore, in this situation, to transform the emerging trends in the marketing environment in opportunities for tourism development, in the attempt of constructing tourism products consistent with the responsible behaviours for the environmental conservation and local communities. Thus, a marketing quantitative research has been conducted in order to identify the opinions of young people on the cultural identity of the potential ecotourism destination Țara Hațegului, conducted on a sample of 236 people. Through this research the identification of preferences for cultural activities has been sought, as well as the reasons for visiting the destination Țara Hațegului and the knowledge degree of the cultural resources fund having as focal point the knowledge of the cultural heritage material.

Keywords: opinions, ecotourism destination, tourism destination marketing, Țara Hațegului.

**DETERMINATION OF PAHs IN THE DUST PARTICLES FROM THE
BURNING SLAG HEAP EMA, (THE CZECH REPUBLIC)**

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ABSTRACT

Considering polycyclic aromatic hydrocarbons as significant indicators of anthropogenic pollution of the environment, this pilot study observes the content of selected polycyclic aromatic hydrocarbons (PAHs) in the dust particles from the burning slag heap Ema, (the Czech Republic). The relevance of PAHs as a pollution load indicator is also supported by the results of monitoring PAH contents in the air of the Ostrava region, namely because PAHs are characteristic organic pollutants in the overall Ostrava industrial agglomeration. The studied locality is Ostrava's conic slag heap Ema. It was gradually formed by piling up mine debris from 1920 to 1960 and its top reaches 315 metres above sea level, 1,033 ft AMSL (above mean sea level). The overall area of the slag heap is 82 ha, and it contains more than 4 million m³ of waste rock. The interior of the heap burns at 1,500 °C. For the purposes of the pilot study, only six congeners of PAHs, including their sum, were monitored in the dust particles, namely: benzo[a]anthracene, benzo[k]fluoranthene, benzo[a]pyrene, anthracene, dibenzo[ah]anthracene and benzo[ghi]perylene. The PAHs dependence on the size of dust particles for the size fraction below 0.063 mm over the 0,063 mm was compared. This study has tested and optimized HPLC parameters in order to establish the best methodology to analyze particle-bound PAH.

Keywords: PAHs, dust particles, Ostrava, slag EMA, HPLC

DISTRIBUTION OF THE TOXIC METALS IN SYSTEM WATER – SLUDGE IN THE BIOLOGICAL WATER TREATMENT PLANT

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ABSTRACT

The contribution concerns of the influence of the polyelectrolyte (PE) addition on heavy metals distribution before dewatering of sludge in the system: Sludge – Sludge water. The heavy metals are dangerous contaminants in the environment, because there is no existing self-cleaning mechanism. The Act No. 188/2003 accompanied by the Act No. 203/2009 adjusts the application of sludge and sediments into agricultural and forest soil. We investigated distribution of heavy metals in sludge of Banska Bystrica water treatment plant. We found out there is no polyelectrolyte influence on a cobalt and a manganese, however, there were noticeable influences found for a nickel and a zinc. The most significant influence was noticed for cuprum due to releasing of the metal to purified water and in reverse iron was bounded with PE into sludge.

Keywords: distribution heavy metals, sewage sludge, polyelectrolytes

DISTRIBUTION OF TURBIDITY IN THE WATER TREATMENT PLANT SETTLER

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ABSTRACT

The purpose of the article was to present research aimed to determine the spatial distribution of the quality of the clear suspension in rectangular settling tank at the Water Treatment Plant. For various indicators of quality of work of settling tank suspension turbidity was chosen due to the fact that it is also normative indicator used to determine the quality of water. Based on studies, the distribution of turbidity in the settling tank was determined. This distribution can be used as a guide for the design and modernization of this kind of settling tanks which are used in the water treatment process. Turbidity is also a diagnostic indicator showing the operating status of settling tank and thus the whole process of the water treatment plant. The purpose of this article is to present the results of studies of turbidity in the interior of industrial settling tank in counter – current multflux sedimentation variant and also to determine the level of suspension turbidity throughout the work area of settling tank.

Keywords: Multflux sedimentation, rectangular settling tank, distribution of concentrations, countercurrent sedimentation

**DYNAMICS OF SEDIMENTATION IN THE BIG TAMBUKAN SULFIDE
LAKE ACCORDING TO THE RESULTS OF ^{137}CS AND ^{210}PB SPECIFIC
ACTIVITY MEASUREMENT**

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ABSTRACT

A series of complex scientific expeditions were carried out. The samples of water and bottom sediments of the Big Tambukan Lake were taken. In these samples the specific activities of natural and anthropogenic radio-isotopes including Cesium-137 and Lead-210 were measured. Due to the results of analysis of cesium-137 and lead-210 vertical distribution in the sediment cores the sedimentation rate in the Big Tambukan Lake is estimated at 3.2 to 3.5 mm per year. The data on the Lead-210 excessive activity is used to study the temporal fluctuations of sedimentation rates. The data present in the report of regular observations of the lake level shows that these fluctuations of sedimentation rates are conditioned by dramatic changes in the lake level.

Keywords: sedimentation rate, sulfide lake, the Big Tambukan Lake, radioisotopes, specific activity.

ECOLOGICAL DOMAIN AND DOMAIN OF PROSPERITY AS PART OF QUALITY OF LIFE

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ABSTRACT

Economic growth has brought prosperity to the Western society; however, it has not brought increase in life satisfaction. This statement known as the Easterlin paradox resulted in the 60s in formulation of the concept of quality of life. This has become one of the current concepts seeking to seize and explain the complexity of social reality. It consists of two dimensions – subjective and objective. The domains of objective dimension among other include also ecology and economics. Ecology takes importance especially in the eudaimonic approach to quality of life, well-being in hedonistic. This excludes the incorporation of environmental economics as a combination of ecology and economics into the concept of quality of life. Some authors use the term quality and sustainability of life, a close relation between ecology and sustainability on the one hand, and quality of life on the other is generally accepted.

Keywords: quality of life, ecology, environmental ethic, prosperity, ecological economics

ECOLOGICAL RISK ASSESSMENT OF THE SEDIMENTS BY THE TRIAD APPROACH

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ABSTRACT

The quality of sediment was assessed at 33 sites in the Kuibishev water reservoir with the sediment quality TRIAD method. The TRIAD approach was used to assess relationships between effects on the benthos community structure, sediment toxicity and sediment contamination. The results of chemical analyses were evaluated using regional criteria for sediment quality. At most of 33 sites studied, the macrofauna community was poorly developed and indicated low abundances of benthic species and a high dominance of tolerant taxa. Acute toxicity test were conducted using the algae *Pseudokirchneriella subcapitata*, the crustacea *Thamnocephalus platyurus*, the rotifer *Brachionus calyciflorus*, the protozoa *Tetrachymena thermophila*, and chronic contact tests were conducted with *Daphnia magna*. The results of bioassays indicated that sediment samples for 17 sites were acute toxic, while chronic toxicity was observed at 28 sites. Using the sediment quality TRIAD approach, accordance between sediment chemistry, sediment toxicity, and degraded benthic communities was observed. Chemical contamination was considered to be the participial factor causing the effects that were observed in the field.

Keywords: sediment, macrozoobenthos, bioassays, triad approach

ECOLOGY ASPECTS OF FIRE RETARDANTS

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ABSTRACT

Most often used fire retardants are not usually eco-friendly. The fire retardant need to protect the material against the ignition and fire. Halogen retardants based on bromine and chlorine are mostly used in electronic industry. But their negative health impact turns companies on use Halogen Free and Brominated Flame Retardants. The results with alternative retardants are not commonly known. The focus of this paper is concerned on fire-retardance potential of various fertilizers based on nitrogen, phosphate and potassium. Therefore many measurements had been made in National Fire Laboratories. The heat resistance was very high in almost each sample. This is the basic condition for their use in fire-fighting. Second condition is their ecology and health impact. This condition must be studied and tested in future tests.

Keywords: Fire retardant, fertilizers, ignition temperature, heat resistance

ECOTOURISM IN VÂLCEA COUNTY - A MARKETING PERSPECTIVE

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ABSTRACT

Natural and cultural resources, a prerequisite for conducting ecotourism in the destination Romania as well, coagulate increasingly more market segments, or retain current targeted segments with new ecotourism components, directing them to new products likely to improve both the quality and the value of tourism products. All stakeholders must work towards fulfilling ecotourism objectives (preservation of natural areas, economic encouragement, and social and cultural protection of local communities), starting with local authorities (which must facilitate compliance with specific regulations on new investments to support the sustainable exploitation of the ecotourism potential), and ending with consumers (who are encouraged and educated in the spirit of caring for the environment and the community, an attitude that transcends the limits of vacations, and that is aimed at improving life).

The purpose of this paper is to determine how ecotourism is seen and understood by them – the results represent a prerequisite for the development of ecotourism products based on the attitude and dimension perceived by them relating to the eco-friendly lifestyle, on the one hand, and their expectations, preferences and intentions, on the other hand. In this context, we conducted a quantitative, descriptive research on a sample of 472 young people for the destination Vâlcea County, which also has (in addition to the balneotherapy resources making it unique) exceptional natural and cultural resources, being subjected to a “radiograph” revealing the ecotourism potential perceived by young people by rendering the rational dimension of its image among them, and the degree of association of a destination with possible favourite ecotourism activities.

Keywords: ecotourism; Vâlcea County; marketing strategy.

EFFECT OF POINT SOURCES OF WATER POLLUTION ON THE QUALITY OF WATER BODIES IN TREBISOV REGION

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ABSTRACT

The article describes the point sources of water pollution in Trebisov region. Based on selected indicators of pollution produced and consequently the disposal of waste water treatment efficiency the interaction on the quality of recipients is quantified. The assessment of the impact of point sources of water pollution is based on applicable laws and regulations which set the residual pollution in discharges directly into water bodies. The water quality in the recipients is generally affected by natural and anthropogenic sources of pollution. Clearly measurable and quantifiable are the point sources of pollution, which are under government regulations not only monitored but also charged. In such cases the impact on the basis of regular measurements of quantitative and qualitative indicators on outputs from wastewater treatment plants (WWTP) prior to discharge to the appropriate recipient is clearly demonstrable. Diffuse sources are also contributing to the deterioration of recipients, but indirectly, i.e. it is directly not possible to identify the producer of discharged wastewater to determine the change in water quality in the recipient. From the above, respecting the legislative environment of water management, it is clear that one of the universal principles of environmental policy "the one who pollutes, pays", can be realised only in the case of point sources of pollution, including, in particular, the WWTP that have to treat the wastewater to the limits of the quality indicators that are set in the Slovak Republic by District Environmental Offices with regard to the development of water quality in the respective recipient. The produced wastewater flowing into the WWTP and the cleaning efficiency directly determine the water quality in the recipient. In Trebisov region all point sources of the pollution of recipients into which wastewater is discharged comply with limits of all the monitored indicators of pollution in the monitored period. This fact contributes to reduction of negative impacts not only on the quality of surface water but also the interaction with other components of the environment and the overall environmental quality of the region and the health of the population.

Keywords: Trebisov region, wastewater, quality of recipient, wastewater treatment plant

**ESTIMATION OF LONG-TERM CHANGE IN MACROPHYTE SPECIES
ABUNDANCE WITHIN FISHPOND SYSTEM ZELENDARKY, CZECH
REPUBLIC, PROTIVIN**

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ABSTRACT

During July and August 2013 phytosociological survey was held, which was focused on macrophyte and submerged plant species abundance in small-scale protected area Zelendarky, Protivin, Southern Bohemia. Protected area includes 10 reservoirs, which are part fishpond system Podkrčí. Study area is located within emergency zone of nuclear power plant Temelin. Phytosociological survey was completed using Brown-Blanquet cover-abundance scale. Data concerning current status of macrophyte vegetation were compared with historical data from 1950–1960, obtained from Czech National Phytosociological Database. Data have been analyzed using classification tables.

Keywords: macrophytes, fishponds, phytosociology, Zelendarky, Czech Republic

EVALUATION OF LANDSCAPE-ECOLOGICAL PARAMETERS OF STEPPE GEOSYSTEMS FOR REGULATION OF RECREATIONAL IMPACT

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ABSTRACT

The recreational pressure for regional protected areas is determined by two principal factors: intensity of external anthropogenic impacts and character of geosystem reactions to various recreational impacts which depend on their environmental sustainability.

Evaluation of endogenous factors is a priority for regulations of recreational pressure. Landscape-ecological approach was used to allocate the integral indicator of stability estimation of recreational areas. The role and the critical values of landscape and ecological parameters of geosystems of regional protected areas were considered with regard to the natural parks "Scherbakovsky", "Donskoy" and "Eltonsky" in the Volgograd region of Russia. These parks, on the one hand, are characterized by high potential and demand for recreation and, on the other hand, their territory representatively reflects zonal spectrum of various types of steppe landscapes, including different variations and combinations.

A result of research is represented by a matrix containing typical degradation factors for various types of steppe geosystems, which is based on the list of critical parameters and their combinations that reduce natural resistance to recreational pressure. The result can be used to develop standards for recreational impact in the regional natural parks throughout the steppe zone of Russia.

Keywords: natural parks, landscape-ecological parameters, recreational pressure, steppe geosystems, Russia

EVALUATION OF POTENTIALLY TOXIC ELEMENTS MOBILITY IN TAILINGS IMPOUNDMENT SLOVINKY (EASTERN SLOVAKIA)

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ABSTRACT

Tailings impoundment Slovinky (eastern Slovakia) was used for deposition of flotation sludge from processing of siderite-sulphidic ores and in the latest phase for the deposition of slag material from processing of Cu ores in Metallurgical plant Krompachy. The impoundment sediments contain high average concentrations of potentially toxic elements (PTE) (As, Sb, Cu, Zn, Pb).

The general aim of this study is to evaluate the leachability and transport of monitored elements from tailings into surrounding environment, to elucidate the impact of different factors (content of Fe and Al, physicochemical properties, dissolution and precipitation of mineral phases, etc.) on PTE mobility.

In order to evaluate the mobility of monitored PTE several single-step extraction experiments were used, basic physicochemical properties were measured, laboratory „pot leaching experiment“ was conducted and the waters flowing into the impoundment, drainage waters, and surrounding surface waters were analyzed.

The studied elements are relatively strongly bound in the the tailings impoundment sediments and are characterized by low mobility, because of the neutral to slightly-alkaline character of the sediments, low solubilities of element-bearing sulphides and low proportion of these elements in easily mobilizable fraction.

Keywords: tailings impoundment Slovinky; As, Sb, Cu, Zn, Pb mobility; single-step extractions, pot leaching experiment, drainage waters

EVALUATION OF SELECTED CHARACTERISTICS OF THE ENVIRONMENTAL LOAD SLOVINKY

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ABSTRACT

Environmental loads are areas contaminated with various industrial activities. Heaps and sludge beds are remnants of mining and mineral processing activities and there are serious problems as far as conditions in Slovakia are concerned. Sludge bed Slovinky (Eastern Slovakia) belongs to the group of high-risk areas, threatening human health and the environmental components due to unfavorable structural condition and it is included in regular monitoring. Flotation waste from mineral processing of sulphide ores and industrial slag from metallurgical processing in fine-grained form were deposited in this sludge bed.

The aim of our research was focused on the study of selected characteristics, especially on pH, neutralization potential, determination of cations and anions (results of the determination of heavy metals concentration have been published in previous work). Selected indicators were determined in an aqueous extract, concentration of calcium and magnesium in HCl extract, pH in both extracts. Assessment of neutralization potential was performed as a static extraction test using US EPA method.

The experimental results showed that the sludge bed has alkaline character, the reached pH values were above 8.5. Content of sulphides is low, created acidity was neutralized by presence of carbonates, and therefore there is no possibility of active acidity production.

Keywords: environmental load, sludge bed, neutralization potential, extracts

EXAMPLES OF ALTERNATIVE METHODS IN INTENSIFICATION OF DESLUDGING SITES

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ABSTRACT

The paper presents specific examples of currently used methods of intensification of desludging sites in Slovakia. Safe operation of desludging sites especially depends on reliable and without fault working dam system. Stated demonstrative examples of realisation of up-raising dams of desludging sites illustrate options and flexibility of laying ashy, industrial and inert geomaterials. The paper presents alternative methods of realisation of up-raising dams from soils and waste hydraulically drifted. For geomaterials (soils and anthropogenic sediments) built into up-raising dams there are analysed chosen geotechnical features in original storage and features affected by way of in-building. Their comparison allows correction: technologic processes of intensification, geotechnical calculations, and range of monitoring and mainly safe operation of these engineering constructions. Creating of database of geotechnical information presents methodically professional solution of interdisciplinary problem of desludging sites.

Keywords: desludging site, dam system, up-raising dam, intensification, industrial geomaterials

EXPERIMENTAL METHOD OF DESIGNING STORM WATER TANKS

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ABSTRACT

The paper shows the essence of CFD modelling. Paper includes practical example of assessment of stormwater basin, by using ANSYS Fluent software. In the verified mathematical models are analysed Proses and propose alternative-improving operation of the tank. This paper also explains the principles, upon which the ANSYS FLUENT software works. Then explains the methodology in creating the model, which is composed of: creating 3D geometry, creating computer mesh, entering of boundary conditions, defining input parameters and finally the actual simulations. In this paper there are also explained methods of modelling, which we use for solving the simulations at the Department of Sanitary and Environmental Engineering.

Keywords: storm water tank, CFD models, turbulent flow

**FEATURES OF HEAVY METALS ACCUMULATION FEATHERS ROCK
DOVES KAZAN CITY**

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ABSTRACT

In order bioindication environment is often used live objects. Birds - labile and an integral part of the urbanized landscape, are convenient objects bioindication and biomonitoring. Synanthropic population Rock Doves plentiful, are found in various types of residential construction, available throughout the year, tied to their places of residence, they can be used as test objects. Feathers pigeons tested for heavy metal content. Level of accumulation of metals in feathers corresponds to the metal content in the snow cover and soil. The metal concentration in the feathers varies depending on bird habitats, season of the year, the type of power pigeons.

It is important that after taking samples for research animals remained degree of accumulation of heavy metals in feathers reflects the dynamics of the level of the toxic load on the habitats of birds.

Keywords: ecotoxicology, Bioindication, heavy metals, dove feathers.

FIELD STUDY OF INFRASONIC IMPACT ON THE GAS AND DUST TREATMENT PROCESSES AT THE HEAT POWER FACILITIES

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ABSTRACT

Atmospheric emissions are cleaned from production pollutants with a variety of methods, approaches and devices. Moreover, researchers internationally look for new approaches and methods to decrease atmosphere pollution with harmful emissions. This work highlights possibilities of infra-sound applied to the gas and dust flow at the heat power facility to assess how such acoustic impact influences concentration of harmful substances in the atmospheric emissions. Results of the infrasonic impact study for the emission pattern of Nitrogen (NO_x), Sulphur (SO₂) and Carbon Oxide (CO) and solid particles are presented in the article.

Experimental theory methods were used to setup the field studies. Applied statistics, factor and regression analysis and mathematical modelling were used to process the experimental data.

Keywords: infrasonic impact, emissions of harmful substances, factor analysis, regression analysis.

**GEODIVERSITY ASSESSMENT OF THE RIO COLCA VALLEY AND ITS
SURROUNDING (SOUTHERN PERU) IN THE CONTEXT OF FUTURE
GEOPARK**

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ABSTRACT

Colca Valley located in southern Peru which forms one of the deepest canyon of the World is the region of unquestionable nature values. The main goal of the study was to elaborate a complex assessment of the geodiversity the central part of this valley, using the multi-criterial, bonitation-parametric method. The following elements of abiotic environment were analysed: morphology, geological setting and waters. The relief analyse was made by describing types of natural landscape; morphologic landform, variability of relative heights and anthropogenic transformations. Presentation of the geology was elaborated with emphasis on lithology, tectonic and volcanogenic structures, presence and possibility of observing active geologic processes. By hydrosphere evaluation: streams; lakes, highland wets, waterfalls, springs, including springs of thermal waters and geysers were analyzed. All geotopes identified during the field work, were assessed and ranked (bonitation). The assessment, involving 3 groups of criteria: scientific values, use values and additional values. Such type complex geotope assessment of the Colca Valley seems to be the first one. Large number of specific criteria allowed to identify the most valuable criteria as well as to provide a wide-ranging assessment of geodiversity. The results of the study show the richness of geodiversity of Colca Valley region connected with its unique landscape values. The region is even more appealing as active geological processes can be observed here easily. Additionally the fame and interest associated with the canyon as well as possibility of watching here the condors, make this region particularly outstanding. The author expresses her hope that the presented results will provide some arguments for the protection of geological heritage of described region, giving the scientific base for future creation here the Colca Canyon Geopark.

Keywords: geodiversity, Colca Canyon, Volcanous Valley, geotope, assessment

GEPARK DEVELOPMENT IN THE SLOVAK REPUBLIC – ALTERNATIVE POSSIBILITIES

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ABSTRACT

As geotourism concept is rapidly growing and developing, efforts to define, characterize and establish “geo-attractive” areas are more and more common all around the world. In addition to classical geoparks, there are smaller areas of significant geotourism importance that deserve attention. The paper is focused on the introduction of an entirely new “small-scale geopark” establishment in the Vihorlat Mountains, immediately at the Ukrainian border, north-eastwards from the Zemplínska Šírava Dam, which is relatively abundantly visited in the summer season. The area of proposed geopark is lacking in job opportunities, and geotourism development could offer one of few possibilities to generate job opportunities especially for young people. On a relatively small area, the proposed territory offers variegated geological features including four first-order geological units of the Carpathians, five mineralogical localities, unique locality of an abandoned quarry in the Pieniny Klippen Belt, karst phenomena, volcanic structures of five stratovolcanoes, one greater and five small landslide closed lakes, and mineral springs. Beside geological attractions, the following historical monuments are also present in the area: two castle ruins and four wooden churches (one of them inscribed on the UNESCO World Heritage List). There are also botanical objects, such as natural forests and protected parks in the area, too. Last but not least, three wineries producing high quality red and white wine are situated in the proposed geopark area, which also offer wine tasting.

Keywords: geopark, geosite, Vihorlat Mts., development

GLASS WASTE AS AN ALTERNATIVE TO NATURAL AGGREGATE

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ABSTRACT

Post-consumer glass represents a major component of solid waste. Current collection methods for glass products are quite limited, therefore, only a small fraction of the solid waste can be recycled directly to the primary market - the bottling and container industry.

This paper is focused on utilization of colored glass bottle fragments in concrete production. To study the possibilities of crushed colour glass bottle fragments utilization as a selected natural aggregate replacement in concrete, eight different mixtures were prepared. Four of these mixtures contained 25% replacement of cement by starting coal fly ash. From all mixtures, samples with dimension 160x40x40 mm were made in our case study. After 7 and 28 days of hardening, samples were tested in flexural strength and compression strength. The results from bottle glass waste application show that glass waste used as an aggregate in concrete has not negative effects on the strength characteristics of hardened concrete, but corrosion properties of coloured glass waste in concrete is necessary to investigate.

Keywords: utilization, glass waste, coal fly ash, concrete, flexural and compressive strength

HEALTH RISK MANAGEMENT OF GEOTOURISTS IN ASIAN COUNTRIES

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ABSTRACT

Geotourism in Asian countries has become very popular nowadays. Increasing number of Slovak tourists vote for popular destinations such as Thailand, China, India. These tourist destination are not fully established on the market yet. Going to such places needs also an ability to manage the risk of being not well informed about health risk issues connected with their stay in Asian countries. This paper describes the visiting pattern of Slovak tourists during the period of 2004 to 2008 and studies their present potential health risks. The paper conclusion brings the opportunities and practical ideas for increasing of the awareness of above mentioned risk. The primary aim of the research is to show that identifying risk factors is a much needed activity requiring investment – mainly into prevention measures.

Keywords: management, geotourism, health risk, diseases,

HEAVY METALS BIOACCUMULATION RATE IN TOMATO FRUIT

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ABSTRACT

The main objective of this study is to investigate the effect of different mineral fertilization doses on the heavy metals bioaccumulation rates in tomato fruit grown in Romanian Western Plain area. The experience was done in a cambic cernosium soil, with low acidity reaction, very good content in nitrogen, phosphorus and potassium and the high natural fertility potential favorable vegetables cultivation. The studied area presented normal levels of heavy metals. The study was performed on control soil samples (without fertilizers) and soil samples after differentiated NPK fertilization in variable doses: N₃₀P₃₀K₃₀, N₄₅P₄₅K₄₅, N₆₀P₆₀K₆₀ and N₁₂₀P₆₀K₆₀. The order of accumulation of heavy metals in soil samples was: Fe > Mn > Zn > Ni > Pb > Cu > Cr > Co > Cd. Tomato showed the highest bioaccumulation rate a N₃₀P₃₀K₃₀ fertilization doses for manganese (0.442%), cooper (15.00%) and zinc (6.494%), a N₆₀P₆₀K₆₀ fertilization doses for iron (0.152%) and a control sample for nickel (1.048%). The order of heavy metals bioaccumulation rate in tomato fruit was: Cu > Zn > Ni > Fe > Mn. The different doses of mineral fertilizers were applied to tomato crop soil determined different bioaccumulation rate in tomato fruit.

Keywords: tomato, mineral fertilization, bioaccumulation rates, heavy metals

IMPLICATIONS OF VECTORS AND ENVIRONMENTAL FACTORS IN THE EVOLUTION OF THE WEST NILE VIRUS MORBIDITY

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ABSTRACT

The present-day world policies have been focusing on improving the programs of epidemiological and epizootological supervision in order to socially and economically protect the human population in the humid and lush vegetation areas specific to deltas and rural regions, susceptible to contamination by arboviruses. The illnesses caused by viruses transmitted by vectors (blood-sucking insects, like mosquitoes) display natural focality, impacting the exposed populations, and thus causing 10-15% of the serious forms of encephalitis and meningoencephalitis. The West Nile virus is one of the most common arboviruses, determining endemic and epidemic symptoms. As people, animal and bird circulation is on constant increase, besides natural migrations, additional measures of epidemiological, epizootological and environmental supervision are necessary. The new supervision policies focus on a better genuine detection of illnesses in the exposed population by means of the unique case definition, and standardised statistical interpretations, together with measures of environmental protection and combating the circulating vectors.

INDICATION OF MACROINVERTEBRATES SPECIES RESISTANT TO FLOW RATE FLUCTUATIONS

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ABSTRACT

Increasingly relevant issues of our time are high fluctuations in climate, which have adverse impacts on a water balance in landscape. Distribution of precipitation is shifted on the border of drought and a spate. These abnormalities are most evident on small streams where are a cause of fatal consequences for a lot of population and species of aquatic animal. The use of macroinvertebrates as a group of organisms for assess the effects of drought is particularly advantageous for the reason that these indication species are present in large quantities. Also, different regulation of water flows brings different spatial variability and the possibility of overcoming natural disasters. It is also important to take into account the possible overlap impact of anthropogenic factors above drought. At the evaluation the situation of the drought has been used three-year monitoring Trusovice stream. It was research on 13-km section of the stream, which different ground and anthropogenic pollution. The research was held during status of flooding and the drought. It pointed the different abilities and resilience of different kinds of macroinvertebrates, which are one of the cornerstones in the revival of flow.

Keywords: macroinvertebrates, drought, flow rate, monitoring, riverbed

INFLUENCE OF ADDITIVES ON ABSORPTION SPECTRA OF FOOD DYE CI FOOD BLUE 5 AND ITS DETERMINATION IN FOOD PRODUCTS

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ABSTRACT

With the aim to use additives in food and health protection of consumers, JECFA develops the concept of acceptable daily intake (ADI). The definition of ADI for additives is based on the proposition of Zehman and Fitzugh (1954). Synthetic food dyes are standardized chemicals with standardized dye strength.

Food Blue 5 (C.I.N⁰42051), Sulphan Blue, is chemically calcium or sodium salt [4-[a-(4-diethylaminophenyl)-5-hydroxy-2,4-disulfophenylmethylidene]2,5-cyclohexadien-1-ylidene] diethyl ammonium-hydroxide of intrinsic salt.

Three methods were used for the qualitative proving of the investigated dye in products. The first method relies on the reaction of dye with 3 M sodium hydroxide solutions and conc. hydrochloric acid. The investigated blue dye was discolored upon the addition of the reagent, which proves the dye. The second method relies on the determination of retention factor (R_f) using paper chromatography. It was found that $R_f = 0.94$ for the investigated dye sample ($R_f = 0.96$ corresponds to standard sample). The third method is the determination of the absorption maximum in visible spectrum, $\lambda_{\max} = 638$ nm. In order to investigate whether particular additives often found in food cause change of chromophores influence in dye molecule and change of its molar absorptive coefficient, it was performed the investigation of influence (vitamin C, citric acid, aspartame) on spectroscopic characteristics of Food Blue 5 using VIS spectrophotometric analysis (350-700 nm). Vitamin C as an additive was confirmed in measurements that does not affect changes neither in intensity of maximum of absorption of dye Food Blue 5, nor in its position. Citric acid leads to changes in intensity of absorption maximum; lower concentrations increase the intensity of absorption maximum to a greater extent. It was determined that 48 h staying of dye Food Blue 5 solution with citric acid gives as a result loss of absorption maximum ($\lambda_{\max} = 638$ nm), and colors of solutions afterwards were lost. It can be concluded that citric acid causes the degradation of chromophore part in dye molecule. In measurements, aspartame does not cause neither change in intensity of absorption maximum in dye Food Blue 5 nor changes in its position.

The value of molar absorption coefficient of dye Food Blue 5 was calculated on wavelength $\lambda = 638$ nm; it is $\epsilon = 22975.42$ dm³/mol·cm. The calculated value is necessary for the quantitative spectrophotometric determination of dye Food Blue 5.

Keywords: Patent Blue V, vitamin C, aspartame, citric acid

INFLUENCE OF GROUNDWATER COMPOSITION ON IONS CONTENT IN THE SOIL PROFILE

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ABSTRACT

Groundwater chemistry is decisively controlled by the natural condition of groundwater circulation and occurrence, i.e. by primary genetic factors of groundwater composition formation, which determine the character, direction and intensity of mineralization processes. In arid and semi-arid conditions with evapotranspiration regime and with mineralized groundwater dissolved ions gets to the upper layers of soil and become the main reason for soil salinization.

Some localities with high-mineralized groundwater were monitored to evaluate proportion of ions in the soil profile in the period 1989-2006. The salt-affected soils occur in some localities at south-west part of Slovakia, where the dry and warm summer climate, evaporation soil water regime and mineralized groundwater create conditions for development of the saline and alkaline soils. Saline soils are widespread in localities with the predominance of sodium chloride in groundwaters and soil solutions. Sodic soils are subject to severe structural degradation and restrict plant performance through poor soil-water and soil-air relations. Sodicity is shown to be a latent problem in saline-sodic soils where deleterious effects are evident only after leaching profiles free of salts.

The indicators of salinization are dry evaporate residue great as 0,2% and electrical conductivity of saturated soil extract EC great as 400 mS.m⁻¹. The indicators of beginning of alkalization processes are exchangeable sodium percentage ESP great as 5% and pH 8 or higher. Presence of sodium is a potential cause of structural instability when Na occupies more than 10-15% of the exchange sites.

Keywords: groundwater, ions, soil profile

INFLUENCE OF VOLATILE ORGANIC COMPOUND EMISSIONS ON THE ENVIRONMENT AND ASPECTS REGARDING THE LEGISLATION IN THE FIELD

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ABSTRACT

This paper presents the impact on the environment and human health of emissions of volatile organic compounds from industrial activities and the laws in effect and falls within the national interest to ensure the sustainability of the environment, sustainable development and increasing health population.

Air emissions not only destroy the living nature and adversely affect human health, but can modify the parameters of the atmosphere itself, which may have ecological consequences and adverse climate.

To prevent, reduce and eliminate pollution level in accordance with the 'polluter pays' principle and the principle of "prevention of pollution" has been set a general framework for control of the main industrial activities, while ensuring prudent management of natural resources.

Keywords: environment, impact, emissions, pollution, volatile organic compounds

INFLUENCE THE PROPERTIES OF SEWAGE SLUDGE CREATING MIXTURES WITH BIOCHAR

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ABSTRACT

The experiments reported in this paper deal with the investigation of properties of biochar with sewage sludge mixtures. Biochar was prepared from waste beech wood, corn waste and wheat straw in the experimental retort. Leaching of mixtures were simulated as natural conditions and the mobility of hazardous elements - manganese, copper, iron and lead was monitored. Elements in solid samples and their aqueous extracts were determined by the emission spectral analysis. Ecotoxicological properties of the extracts were evaluated by standard biotests. The experimental results demonstrate the inhibitory effect of biochar which had been added to the sewage sludge such a way that the rate of leachability of these elements into the water was reduced in comparison with the biochar sample without the addition of sewage sludge. In samples biochar operates as an adsorbent, or it is involved in retarding process of their availability into aqueous medium.

Keywords: sewage sludge, charcoal, risk elements, ecotoxicological tests

**INTEGRATED POLLUTION PREVENTION AND CONTROL:
CURRENT PRACTICES AND PROSPECTS FOR THE DEVELOPMENT
IN RUSSIA**

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ABSTRACT

Opportunities and barriers for the practical implementation of Integrated Permitting system in Russia are discussed. Results of sector pilot projects aimed at the implementation of Best Available Techniques and environmental performance enhancement are analysed. Recommendations on the gradual transition to Integrated Permitting are formulated.

Keywords: Integrated Pollution Prevention and Control, Best Available Techniques, Integrated Permits.

LAND USE/COVER CHANGES IN THE DIEN KHANH DISTRICT, VIETNAM, IDENTIFIED USING REMOTELY SENSED DATA

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ABSTRACT

The growth of population and economic expansion in the past few decades is apparent in many developing countries. The economic reforms in Vietnam since the 1980s have brought a positive impact on the economy and well-being of its population. On the other hand, the rapid development is driven by the enormous exploitation of natural resources and a fundamental change in land use patterns. The past two decades of landscape history of Vietnam can be characterized by deforestation, industrialization and urbanization processes. Due to the lack of official statistical data and its restricted accessibility, remotely sensed data represents the most precise available source for the study of landscape changes in the region. LANDSAT 5 and 7 images taken in 1996 and 2009 were processed, classified and compared in the ENVI environment. The outcomes of the image analysis were verified by field work (photography) and followed up by the calculation of landscape metrics in the V-LATE ArcGIS extension for both years. Finally, the quantitative results were supplemented with qualitative research. The Land use/cover changes in the region were discussed with the local residents using structured interviews in order to get information about the perception of the LUCC and the economic situation over the past 15 years.

Our results indicate a clear trend in the reduction of natural and semi natural landscape patterns such as forests, grassland and bush areas due to the increase of arable land, located mainly in lowlands. Forested areas have been cut down or burnt mainly on account of the expansion of horticulture and plantations. These processes took part mostly on gentle slopes suitable for planting other crops such as bananas. Due to these processes, natural areas tend to be more fragmented. The research presented documents the fundamental and rapid changes together with their driving forces. The deforestation and the expansion of arable land in the mentioned period is typical for similar regions in Vietnam and developing countries in general.

Keywords: land use, land cover change, remote sensing, Diên Khánh district, Vietnam

LEGAL FORMALITIES OF GEOPARK ESTABLISHMENT IN SLOVAKIA

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ABSTRACT

Worldwide geotourism growth and development often results in activities that are often connected to the geoparks - areas of geological heritage conservation, preservation and presentation. Geopark establishment represents one of the first steps in the process of geotourism development in any area. This paper is devoted to designation and description of legal formalities comprising of Acts and Announcements of Slovakia needed for geopark establishment in this country which has undisputed but still poorly used geotourism potential, including all the principal stages within the geopark establishment process: formation of the civil association, geopark building, and assessment of environmental impact. As geopark establishments positively affect geotourism development, support economic growth and sustainable development, it is desirable to make such activities that may help to run geoparks within geotourism attractive areas.

Keywords: geopark, establishment, Slovakia, requirements

**LOST MINING LANDSCAPES AND THEIR USE IN GEOTOURISM.
A CASE STUDY FROM THE DOLINA PEKLO - HELL VALLEY IN THE
CENTRAL SLOVAKIA**

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ABSTRACT

The mining tourism of today focuses mainly on the preserved relics of mining landscapes, whether they are represented by the terrain shapes on the surface or underground, the existing buildings and technical equipments and their relics, or residential buildings and various mining points of interest in the landscape. These historical mining landscape are accessed by visitors via various sightseeing tours, educational trails, bicycle trails etc., whose common feature is the necessity of the in situ presence of stationary posters and information panels.

Slovakia has many medieval and early Modern Age mining sites, which rank among the most important in their period, but many of them lack any preserved and visible mining relics in the present landscape. A similar situation is also in the Peklo Valley situated in the hinterland of the former free royal town Ľubietová (Central Slovakia), which belonged to the most important mining sites in Hungary in the 19th century.

The mining and metallurgical site Peklo (Hell) was reconstructed upon the research of archival documents and historical maps. We have reconstructed the possible landscape appearance in the 17th – 18th century. A smelter (the Slovak blast furnace) for the smelting of iron ore mined in the local mines was situated here. The waterwheel was used to blow air into the blast furnace. The second waterwheel in this site was used to propel the watermill. A network of waterways and pipes was present, together with the place for charcoal burning, as well as a warehouse for charcoal and tools storage. The site contained three wooden cottages built for miners, metallurgists, woodcutters and charcoal burners. A hereditary mining gallery was a part of the complex apart from galleries for iron ore mining.

We have created a 3-dimensional landscape model of the site in the given historical period, based on archival and field research. The site visualization could be freely available on the Internet in the future and tourists would be able to download it to their portable computers or mobile devices.

Historical mining sites presented in this form and freely available directly from the field, will represent an important part of the mining tourism in the coming years.

Keywords: lost mining landscapes, mining tourism, Peklo Valley, 3-D landscape model, geotourism

MERCURY AND ORGANIC MATTER IN BOTTOM SEDIMENTS IN THE PROFILE DON RIVER- SEA OF AZOV

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ABSTRACT

Large-scale and long-term studies of the total mercury distribution in the sediments of the area and the profile of the Don River – the Sea of Azov is made. The samples of bottom sediment were sampled from the shipboard by means of a coring tube. The determining of total mercury concentration was produced by cold vapor atomic absorption spectroscopy. The organic carbon content was determined using a high organic carbon analyzer and ranged between 0.26 - 3.19 %. The content of mercury was varying widely - from 0.01 to 5.0 µg/g dry weight at different times in the sediments of the Don River, the Taganrog Bay and the Sea of Azov. It is observed that high concentrations of mercury are associated with impact areas (urban agglomerations, port terminals), where organic matter of anthropogenic origin is damping. The concentrations of mercury tend to increase in sediment with increasing concentrations of the clay and organic matter fractions of different genesis. There is a close correlation between total mercury and organic carbon. This indicates greater role autochthonous and allochthonous organic matter in the accumulation of mercury in the bottom sediments in comparison with mineral substance. During the storm, re-suspension of the top layer of sediments and transfer of mercury in the water column is observed. A reverse process of deposition of mercury in mineral and organic slurry is defined afterwards.

Keywords: Don River, Sea of Azov, Taganrog Bay, mercury, organic matter, bottom sediments.

MODERN TENDENCIES OF ECOTOURISM DEVELOPMENT IN WESTERN SIBERIA

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ABSTRACT

The article presents an analysis of the recreational potential of Western Siberia, problems of implementation and prospects for the development of ecotourism in the area. The authors describe strictly protected areas of the Tobolsk area, in terms of originality and aesthetic significance, natural potential, and biological diversity. The unique floristic area is also analyzed. The basic reasons for the low efficiency of ecotourism are considered below. The authors consider opportunities of using of multilingual digital multimedia resource to solve this problem. Suggested specialized presentational product “Tobolsk mainland” is aimed at exploring a wide range of local and foreign network users with unique capabilities of ecological tourism in geographical description in Western Siberia. What are the impacts and challenges of ecotourism? What are the possible benefits that ecotourism can bring? Is ecotourism in Western Siberia sustainable? In order to increase the likelihood that ecotourism achieves goals of sustainable development in Western Siberia, all of the key actors must begin to take more proactive measures in order to ensure that ecotourism is carefully planned and implemented.

Keywords: ecological tourism, sustainable development, strictly protected areas, biological diversity.

NATIONAL APPROACHES TO GEOTOURISM AND GEOPARKS IN ROMANIA

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ABSTRACT

The paper is aimed to highlight the way geoparks and geotourism are understood and planned in the Romanian national policy and practice. Given the complex purpose of geoparks, the study focuses on the way geotourist experiences are built by the local managers of Hateg Country Dinosaurs Geopark in relation with the concepts of tourist authenticity and sense of place.

Keywords: geotourism, geoparks, destination management, tourism policy.

NOISE IMPACT OF MOTOR AND RAILWAY TRANSPORT ON REGION ENVIRONMENT

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ABSTRACT

The noise pollution is one of types of physical impact on environment components. This influence was considered from transport streams – the railway and motor transport. The case study was considered on a site of crossing of motor and railway transport near the city of Volgograd, Russia (a site of the federal highway of M6 the "Caspian", the 13-th km the settlement of "Kuzmichi"). Authors were counted a transport stream at different time of days by types of transport and its contribution to noise pollution is estimated. Data on chemical pollution of atmospheric air on this site are in addition provided.

The authors used monitoring methods on non-stationary posts of supervision over intensity of a transport stream and pollution of atmospheric air, information from statistical sources and transport enterprises. The quantitative chemical analysis of atmospheric air was made on photometer (sulfur dioxide, carbon (colloidal carbon), formaldehyde, nitrogen oxide, nitrogen dioxide), chromatograph gas (C1-C10 hydrocarbons), scales (dust), gas analyzer (carbon oxide).

Keywords: noise pollution, motor transport, railway transport, region, pollution of atmospheric air.

**OBSERVATIONS ON THE IMPACT OF THE USE OF FERTILIZERS IN THE
FRUIT GROWING ON THE WATER ENVIRONMENT OF DAMBOVITA
RIVER**

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ABSTRACT

This paper aims to analyze the ecotoxicological risks of fertilizer on the aquatic environment of the Dambovita River. Analyzed substances are highly toxic, it represents a serious approach to ecotoxicology. Toxic effects of substances considered significant risk to human health through physiological changes of human and animal blood (methemoglobinemia). For spectrophotometric determination of nitrate, nitrite and ammonia nitrogen were analyzed by four water samples collected from two different points before and after spraying fruit trees. A higher concentration of nitrates in water leads to negative effects on both aquatic and terrestrial ecosystems. Regarding aquatic produce nitrate groundwater pollution and eutrophication layer of surface water. The negative effects of ammoniacal nitrogen occur in a higher concentration of 0,3 mg/l, very close to the value obtained.

Keywords: ecotoxicology, nitrates, spectrometry, eutrophication, methemoglobinemia

OPERATION OPTIMIZATION FOR MUNICIPAL WASTEWATER TREATMENT PLANTS OF HIGH CAPACITY

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ABSTRACT

The present paper starts with a review of existing wastewater treatment systems and mentions how to improve and optimize the plant components operation. The case study is for a wastewater treatment plant of high capacity, serving a village of aprox.75.000 inhabitants. The analysis method is based on efficiency monitoring of reduction reaction of nitrogen through the biological treatment phase. There are highlighted the technical and economic efficiencies of comparative solutions. Thus obtained internal architectures for existing urban wastewater treatment plants adapted to the concrete situation occurred at some point during their operation.

Keywords: wastewater treatment plant, nitrogen reduction, operation optimization, internal architecture

OPTIONS AND TRENDS OF LAND CONSOLIDATION IN THE CZECH AND SLOVAK REPUBLICS, WITH REGARD TO COMMON HISTORICAL DEVELOPMENT OF OWNERSHIP AND USAGE RIGHTS

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ABSTRACT

This paper defines and compares the benefits of land consolidation (LC) projects in terms of land ownership fragmentation and also in terms of the landscape on the model of the Czech Republic (CR) and Slovak Republic (SR). There are two basic selected problems. The first is high ownership fragmentation, which is closely related to the limited availability of land, weakened protection of ownership rights, imperfect ownership registry, real inaccessibility of parcels from public field roads etc. The second issue is related to the condition of the rural landscape due to the large imbalance between ecologically stable and unstable surfaces. This imbalance causes higher rates of local flooding, wind throw disasters, high water erosion, irreversible loss of good agricultural land, silting of streams, repeated building damage etc. Next, this paper presents the basic characteristics of ownership in the Czech and Slovak Republics (e.g. average number of co-owners per one plot, number of plots, number of proprietary relations) and compares selected values that represent landscape conditions (e.g. level of water erosion). We start from the basic common historical landmarks that have affected ownership fragmentation and inconsistency between proprietary relations and the present relations of use. Detailed analysis of methodology procedures for land consolidation is performed. Then we compare the input and output data from two completed projects (on the CR and SR). The specific values before and after the design of land consolidation are compared. For example, the portrayal of property, number of plots, number of owners, average size of plot, length of field roads, area of erosion control, water management, ecological stability measures and other issues. The aim of this paper is to highlight the overall strategy of land consolidation, explain the basic principles of design of projects in both countries and provide a foundation for improvement in future coordination, stability and effectiveness in land consolidation.

Keywords: land consolidation, ownership, fragmentation, condition of rural landscape, rural development, common facilities, Czech Republic, Slovak Republic, comparison

OVERVIEW OF TECHNICAL METHODS USED TO TREAT SLUDGE FROM DRINKING WATER TREATMENT PLANTS

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ABSTRACT

Over the last few years, sludge from water treatment processes, especially those from urban waste water treatment plants, became a debate subject in the European Union. This reflects the increasing awareness of the fact that sludge quantities are constantly growing.

If we take a look on the Romanian legislation we can see that sludge resulted from wastewater treatment processes are very strictly regulated but the sludge resulted from drinking water treatment processes are not subject for those laws. Because sludge from drinking water treatment is not subject to OM 344/2004, spreading it on land would mean using it without any regulations to control environmental effects.

This paper aims to present the trends and technologies for processing, recovering and disposing the sludge produced in water treatment plants with concrete examples.

Keywords: Romanian legislation, sludge, water treatment plant, treatment process, dry substances.

PHOSPHORUS TRANSPORT MODELLING BY WATEM/SEDEM USING EXPERIMENTAL DATA

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ABSTRACT

This article presents the comparison between the indirect determination of the transported dissolved phosphorus (using the equation of Sharpley, 1995), based on usually used enrichment ratio and assumed share of the dissolved phosphorus in the total transported phosphorus during the erosion event, and the direct determination of the transported dissolved phosphorus amount, based on the newly derived methodology in the Býkovice catchment. The inputs into the calculation are the dissolved phosphorus concentration in runoff and the bioavailable phosphorus concentration in the soil (Melich III test) measured in the Býkovice catchment during the synthetic c rainfall-runoff events

Keywords: Water erosion, sediment transport, enrichment ratio, total phosphorus, dissolved phosphorus

**PILOT REMEDIATION OF CONTAMINATED MINE WATERS AT
ABANDONED SB DEPOSIT POPROČ (SLOVAKIA)**

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ABSTRACT

The topic of ground and surface water remediation is very actual and frequently realized. There are many remediation technologies developed and used to eliminate or decrease (under appropriate limits) the level of contamination. Research dealing with development of the remediation technologies including polices for rapid and economical decontamination is still in progress at the present time. Contamination of environment, mainly by arsenic and antimony, define locality Poproč as environmental load with real influence on available water sources. Main goals of our study supported by Slovak Research and Development Agency (project number: APVV-0344-11) are:

- 1.) To define the reduction rate of contamination extension at selected locality after application of settling basin, or passive aerobic wetland
- 2.) Experimental verification of controlled crystallization of secondary minerals for proposes of mine and technological water remediation
- 3.) Verification of suggested remediation methods applicability in pilot scale experiment
- 4.) To characterize and identify mineral phases originated during the experiments, classify them as waste or as alternative metal source
- 5.) Suggest the final solution of the area remediation

Keywords: antimony, arsenic, pilot remediation, mine water, Poproč

**POLLUTION INDEX CALCULATION FOR GEOCHEMICAL ASSESSMENT
OF HEAVY METALS IN WATERCOURSES CONTAMINATING WATER
RESERVOIR RUZIN I. (SLOVAKIA)**

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ABSTRACT

The contamination of aquatic and terrestrial ecosystems with heavy metals and other mining chemicals have been major environmental problems in many mining areas of the world. Industrial wastes, geochemical structure and metals mining create a potential source of heavy metal pollution in the aquatic environment especially in sediment. Water reservoir Ruzin located in east Slovakia is one of the most contaminated sites by heavy metals originating from mining activity. Water reservoir Ruzin I. is situated in territory, which is well-known by its mining and metallurgical history for several centuries, such as ore deposit Smolnik. Surface water from this area is contaminated by acid mine drainage (AMD) outflowed from abandoned sulphide mine Smolnik. AMD with low value of the pH (about 3-4) is a result of chemical oxidation of sulphides and other chemical processes in mine. The pH increasing due to the mixture AMD with surface water is followed by metal precipitation and its sedimentation in water environment. Contaminated sediment is transported by erosion processes into the river Hnilec and then into water reservoir Ruzin.

The data in this work were undergo several experimental procedures including statistical analyses, normalization and estimating anthropogenic impact factors to establish the concentration and identify the status of each heavy metal under investigation. The aim of this study was to evaluate the chemical quality of the sediment influenced by the mining activities from Smolnik creek through the Hnilec river until to water reservoir Ruzin I. by calculation of the enrichment factor, pollution load index and geoaccumulation index.

Keywords: Acid mine drainage, heavy metals, pollution load index, enrichment factor, geoaccumulation index

**POSSIBILITIES OF GEOTOURISM
IN PRESOV REGION IN SLOVAKIA**

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ABSTRACT

The article deals with analysing of various possibilities of geotourism in Presov region in Slovakia. We analyse the number and type of various geotourist attractions in this region. Firstly, we characterise the possibilities of geotourism. We try to show the environment, heritage and characteristics of the geotourist attractions. Next we analyse the number of visitors both domestic and foreign. Last, we show the possibilities for better presentation of selected geotourist attractions. We think that very important is to describe geotourist attractions in Presov region because this region contains many types of sightseeing and also, they are very attractive for visitors.

Keywords: geotourism, geotourist attractions, Presov region, Slovakia

**POSSIBILITY OF INTENSIFYING THE SEDIMENTATION PROCESS OF
COAL SUSPENSION BY THE USE OF SYNERGIC INFLUENCE OF
MULTIFLUX SEDIMENTATION AND FLOCCULATION**

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ABSTRACT

This paper presents the research of the sedimentation process of suspension coal assisted with flocculation in the multiflux system. The aim of the coal sedimentation investigation is the evaluation of the influence of the individual techniques of sedimentation intensification on the effectiveness of the sedimentation process: flocculation process, use of multiflux fillings, and simultaneous application of both previously mentioned methods. The research presents the impact of the simultaneous use of both intensification techniques to increase the values of sedimentation rate and compression level of the suspension. Tests were carried out for different doses of flocculant. The process was carried out in the laboratory that imitated (simulated) multiflux sedimentation and a conventional system without the multiflux filling. The results presented within this paper are obtained from experiments done in the static system, as well as from the measurements in the flowing system. Research have shown the validity and effectiveness of the simultaneous application of multiflux sedimentation and flocculation.

Keywords: sedimentation process, coal suspension, multiflux filling.

**PRESERVATION OF GEODIVERSITY OF THE COLCA CANYON
AND THE VALLEY OF THE VOLCANOES AS A NECESSARY CONDITION
FOR ECONOMIC DEVELOPMENT OF THE REGION**

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ABSTRACT

Polish Scientific Expedition Peru (PWNP) has been documenting, unique in the world scale, environmental qualities of the Colca Canyon and the Valley of Volcanoes in south Peru since 2004. The study area is located on the active edge of the continent where development of the Andean orogeny and volcanic activity occur. The main goal of the PWNP is to protect geodiversity, the unusual landscape and values of animate nature and culture. Clearly visible records of structures and sedimentary environments, tectonic deformations, magmatic and volcanic processes, evolution of the area, and other features have been preserved in the walls of the Colca Canyon. There are areas of active tectonic and volcanic processes and landslides in its vicinity (e.g. in the Valley of Volcanoes).

The Colca Canyon is the second, after Machu Picchu, the most often visited tourist destination in Peru. It is also the subject of strong investment pressure exerted especially by tourist and recreation industry. Unfortunately, the development takes place without any prepared plan or its impact assessment on places of highly rated environmental values. In the last few years, many rock outcrops and landscape zones have been seriously damaged by construction of hotels, tourist resorts or roads. Some of those investments have been discontinued due to too high costs, development of mass movements on the slopes or the lack of interest of potential users. The lack of set limits and scales of the development means that the basic natural values, which have been the main attraction of the area, are endangered there.

The paper presents the concept of development of the area of the Colca Canyon and the Valley of Volcanoes according to principles of sustainable development. The results of indexation of the area covering identified environmental resources, including the ones endangered by anthropopression have been described and the areas suitable for certain forms of development have been identified.

Scientists who were the members of the PWNP and representatives of naturalists and geologists from Peru claim that it is the last chance to preserve the true character and natural values of the Colca Canyon and the Valley of Volcanoes. The Institute IGEMMET (Peru) developed a project of Geopark project covering the Valley of Volcanoes, which is the first step to protect geological, especially volcanic phenomena, and to promote its tourist and educational values. Protection of geodiversity and

landscape values, animate nature and culture require formation of the Colca Canyon and the Valley of Volcanoes National Park.

Keywords: National Park, Geodiversity, Colca Canyon, Valley of the Volcanoes, Peru

**PROBLEMS AND PROSPECTS FOR TOURISM DEVELOPMENT
IN THE BAIKAL REGION, RUSSIA**

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ABSTRACT

In the Baikal region there is difficult environmental, economic and social situation associated, on the one hand, with the protection of the Baikal natural territory, Lake Baikal as the World Natural Heritage, and, on the other hand, with the need to conduct economic activity in the region. According to the legislation, the prospects for economic activity within the Baikal Region, most likely, can be linked to tourism, although on a limited scale. Special Economic Zone of tourist-and-recreational type (tourist recreational zone – TRZ) “Baikal harbor” was formed in which connection possible influx of large numbers of tourists is expected [2]. Tourism development can contribute to the socio-economic development of the region, which has long been considered "depressed".

Comprehensive studies of students and scientists of Lomonosov Moscow State University have been carried out for several years in the Baikal region of the Republic of Buryatia in the area of TRZ "Baikal harbor". The environmental, economic and social factors and preconditions for tourism development in the research area are considered in the article. Special attention is given to the historical and toponymic research which helps to study the history of human activity and contemporary nature management.

Keywords: tourism, economic activity, environmental situation, Baikal region, Lake Baikal, Baikal natural territory.

**PUBLIC AWARENESS AND INVOLVEMENT OF MANAGERS FROM
TIMISOARA (ROMANIA) IN ENVIRONMENT PROTECTION**

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ABSTRACT

Regardless the country we are coming from, the environment condition depends on each individual, directly influencing our health and life. Because some of us don't consider this aspect is important and don't understand the fact that they have to become more responsible in order to live in a clean environment and to breathe a clean air, we realized a study concerning the environment and the involvement of the population in the environment problems. The research was done in Timisoara city, located in the Western part of Romania, a city with large number of inhabitants and where the economy development is a priority and because of the intense human activities the environment has to suffer. The research method we used is the sociological survey, and the information was obtained through a questionnaire applied on a sample of 200 persons. The study proposes the awareness and involvement of the population in taking measures to protect the environment, because it is only human's power to take efficient measures and to find solutions to prevent this harmful process.

The managers and the population should be focused on the environment protection and to take the necessary measures in order to develop a pro-ecological behavior.

Keywords: environment protection, pollution factors, pro-ecological behavior

QUANTITATIVE AND QUALITATIVE METHODS USED IN THE STUDY OF TOURISM ACTIVITIES IN MEHEDINTI COUNTY AND POSSIBILITIES FOR THEIR OPTIMIZATION

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ABSTRACT

In shaping the economical and technical processes and tourism activities in Mehedinti County, there can be used with excellent results delicate notions of differential geometry, the theory of differential equations, the theory of dynamic systems and the stability theory. Recent achievements are also in the study of stability of dynamical systems with applications in economics and technology. Actually there are studied the stability of models described by differential equations and systems of complicated differential equations. These are nonlinear and complicated further by the fact that they are staple.

The economic shaping provides the tourism manager the rigorous side of his actions (the science to lead), multiple ways of reconciling the existing resources (human, material, financial) with the objectives formulated for a certain period of time, giving him the opportunity to think and decide better and faster without distorting the reality in the Mehedinti tourist area.

The membership of eco-tourism to sustainable development plan is outlined by the manner of formation of defining characteristics (mobility, dynamism and ability to adapt to the needs of each tourist) and the specificity of tourism product which in turn is the result of complex combinations of services, which correspond to specific mechanisms of use in terms of eco-sustainable development.

The measurement of tourism by creating a system of indicators and models took into account the orientation of the field to the design and development based on the planning of processes of environment issues sustainability, implementation of those projects based on the harmonization of the activities with the environment, local community and other sectors of the economy.

Keywords: shaping, optimization, tourism, eco-sustainability, theory

RECLAMATION OF SULFUR MINE EXCAVATION PRESERVING ECOLOGICAL BALANCE

MSc Eng. Agata Dąbal

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ABSTRACT

Sulfur from the deposits located in the south-east of Poland was extracted by open pit and perforation methods. Once the extraction stopped, the reclamation of excavation sites and cavity areas started. One of the excavation sites, located in Machow, was reclaimed in water direction, creating the artificial reservoir with the depth of 42 m and surface 4.5 km² which is nowadays used to recreational purposes. The creation of water body, standardized as a bathing area, was possible thanks to isolation of the deposit layer and a proper selection of water used to fill up the reservoir. The conducted examination of the reservoir water made it possible to establish the type of the reservoir and its pollution balance. Currently, the reservoir water may be characterized as one with low contents of biogenic substances, insignificant salinity and lack of hazardous substances. The research performed indicated that the system is characteristic for typical dimictic lakes. The area devastated by mining activity was reclaimed. This reservoir is particularly important because of the lack of natural lakes in this region and small amount of places useful for water recreation. Yet, the impact of recreation can be dangerous for water quality in reservoir and cause acceleration of eutrophication processes.

Keywords: sulfur mine, reclamation, water reservoir, water quality, recreation

ADSORPTION OF MALACHITE GREEN ONTO BENTONITE MODIFIED WITH CARBOXYMETHYL CELLULOSE

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ABSTRACT

The adsorption of malachite green dye on the modified bentonite with carboxymethyl cellulose was investigated using SEM. The experimental isotherm data were analyzed using the Langmuir equations. Natural bentonite shows stronger attachment to adsorbed dye (on the basis of parameters of adsorption isotherms). Values of R_L show that in all investigated cases favoured adsorption were happened. Natural bentonite shows lower adsorption capacity compared to bentonite samples modified with carboxymethyl cellulose.

Keywords: Malachite green: Bentonite: Adsorption isotherm: Carboxymethyl cellulose

RESEARCH ON MUDS RESULTED FROM WATER PURGING IN ROMANIA

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ABSTRACT

About 80% of Romanian cities have a combined sewerage system (domestic wastewater and rainwater). Industrial discharging have also an important share in the final outcome of WWAT, consequently, the discharge of industrial wastewater might significantly influence the mud quality.

The main options for mud management include: agricultural administration, incineration or co-incineration, waste deposit discharging, forest or degraded land administration.

In Romania, the mud is currently stored in WWAT (91%), discharged to waste deposits (9%) or used in agriculture (0,2%). The incineration is not used since Romania doesn't have operating incinerators for solid waste and mud. The mud production is a continuous process which implies finding flexible and safe discharging solutions.

The mud use in agriculture or its recycling for energy recovery are forbidden for waste deposits, so the alternative options, such as the use on forest or degraded land administration, become important.

Keywords: research, mud, water purging, energy recovery, deposits, agriculture

**RESEARCH ON THE ICHTHYOFAUNA STRUCTURE FROM ROSCI0066
DANUBE DELTA-MARINE AREA SITE IN VERNAL SEASON 2012**

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ABSTRACT

The study is part of a larger study of the ichthyofauna research in ROSCI0066 Danube Delta-Marine Area site, developed over several years, contributing to the development of a plan of management measures for biodiversity conservation in this area. To achieve an complete inventory of present ichthyofauna in an important site in the Natura 2000 network have been achieved scientific fishing expeditions, as required current legislation. To study the ichthyofauna has been used the method of randomized samples extracted, which is a part of the overall population and provides useful information to characterize the entire population. After species identification and performing counting measurements were analyzed class structure length, weight and age, according to a specific methodology. Fish catches have revealed greater diversity in the Sahalin area where they have been 8 fish species of which 5 with commercial importance. Sprat was in large quantities in all catches; turbot, alose and sturgeons were underrepresented. Weak representation of alose and sturgeons could be the consequence of reproduction migration. Data obtained are considered preliminary, and further research will show correctly the real situation in the ROSCI0066 Danube Delta-Marine Area site.

Keywords: biodiversity, environmental protection, fish, Natura 2000 sites

**RESEARCH ON THE PHYTOPLANKTON STRUCTURE FROM ROSCI0066
DANUBE DELTA-MARINE AREA SITE IN VERNAL SEASON 2012**

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ABSTRACT

This study represents a step in a comprehensive research study of specific aquatic flora and fauna for ROSCI0066 Danube Delta-Marine Area site developed over several years. The final result of the research will be the development of a plan of management measures for biodiversity conservation in this area. The phytoplankton is a fundamental link in the trophic chain and is one of the indicators to assess the status aquatic ecosystem. To assess the qualitative and quantitative structure of Phytoplankton in vernal season 2012 has been used samples collected from marine area with plastic water sampler (Niskin type). The qualitative structure of phytoplankton was characterized by the presence of 41 species belonging to 7 algal taxonomic groups: *Bacillariophyta*, *Dinoflagellata*, *Chlorophyta*, *Cyanobacteria*, *Chrysophyta*, *Euglenophyta* and *Cryptophyta*. The diatoms have dominated the number of qualitative structure of phytoplankton species in most study areas, their share ranging between 18% and 53%. The dinoflagellates were the second group that diversity, the proportion ranging from 6% and 44%. Marine waters from ROSCI0066 site, in vernal season 2012, were characterized by values of densities of $48 - 4300 \cdot 10^3 \text{ cells} \cdot \text{l}^{-1}$ and 0.04 to $1.62 \text{ g} \cdot \text{m}^{-3}$ for biomasses. The diatoms have dominated for more than 72% in density and 43% in biomass. In conclusion the phytoplankton is not presented as an integral whole viable, but is rather the appearance of a heterogeneous floating tanatocenosis. It seems that in the site ROSCI0066 Danube Delta-Marine Area not exists a specific phytoplankton; the mixed waters from here are always pushed by winds and currents in all directions, especially towards South.

Keywords: biodiversity, biomass, density, environmental protection, Natura 2000 sites

**RESEARCHES REGARDING THE INFLUENCE OF AMMONIA
CONCENTRATION GROWTH FROM WATER OVER THE PRODUCTION
OBTAINED IN FISH FARMS**

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ABSTRACT

Ammonia poisoning causes significant production losses in livestock farming of carp. Therefore, the purpose of the paper is to assess the causes of ammonia poisoning, as well as the disorders that may occur in body of fish. The researches were conducted in six ponds located in Ilfov region, populated with carp (*Cyprinus carpio*). During the experiment it was noted the correlation between ammonia poisoning of fish and the pH values and temperature of water. The increase of the pH value and the water temperature prevents removal from the body of ammonia resulted from protein metabolism, as well as it accelerates the transformation of ammonium ions into ammonia and the introduction of it in the carp's body. Ammonia poisoning causes serious disorders at blood level, respectively it reduces the number of erythrocytes, the value of hematocrit and that of haemoglobin and it increases the concentration of ammonia.

Keywords: ammonia, carp, water pH, water temperature, hematologic analyzes

**RESEARCHES REGARDING THE VOLCANIC TUFF UTILIZATION IN
TURKEY FARMS TO APPLY A CORRECT MANAGEMENT
OF TOXIC EMISSIONS**

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ABSTRACT

The intensive/industrial growth activity of animals is one of the major sources of greenhouse gases emissions (GHG) - 18% of the global emissions (according to the FAO estimation). The greenhouse potential of NO₂ is over 300 times greater than that of CO₂. It is estimated that two thirds of the agricultural greenhouse gases emissions is due to NO₂ resulted from the decomposition of litter. By applying the volcanic tuff in bedding at a rate of 40% and 3-5% in compound food for turkey broilers, much of the nitrogen compounds that result from the breakdown of food protein, are retained in the pores of the adsorbent. In the absence of the absorbent, they contaminate the environment, mainly in two ways - by volatilization (about 40-50%) contaminates the atmosphere and the elution (about 25-30%) contaminate water sources. Only 20-25% of the initial nitrogen content of animal litter reaches (in terms of current technology) to be used as nutrients by plants. The beneficial action of volcanic tuff consists of massive retention of nitrogen compounds in the pores (contaminant stabilization) and their gradual release into soil, in the rate at which plants can use this source of nutrients. Thus, from a major source of pollution, nitrogen compounds from litter can become a good source of natural fertilizer, much more efficient than at present. During the realized tests, the average decrease in mortality is 18% in the experimental batch compared to the control batch. Moreover, there was a positive evolution, regarding the weight at the final slaughter, the experimental batch having a weight average with 3.8% higher than the control batch.

Keywords: turkey broilers, volcanic tuff, toxic emission management, bioproductive parameters

REVIEW OF CURRENT TRENDS IN WAYS OF FLY ASH APPLICATION

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ABSTRACT

Environment, sustainability, waste free and economic is the concept used in today's world. The prognosticator stresses the dangers of natural resources exhaustion. In accordance to the criteria of sustainable development, environmentalists emphasize the necessary changes in the consumption of limited natural resources due to ensure the energy saving, and material recycling. Power and heating plants seems to be a worldwide problem in terms of huge amounts of waste production. At the other hand this waste has a great potential to substitute a natural raw sources. Fly ash, a by-product of the coal-burning power industry, is an industrial waste having the great significance to its multifunctional applications. It is defined as a fine grained residue of coal combustion in thermal production stations of electrical energy, which particles are smaller and almost totally spherical in shape, allowing them to fill voids, flow easily, and blend freely in mixtures. The current annual worldwide production of coal ash is estimated about 700 million tons of which 70 % is fly ash at least and based on the more references, fly ash can be used in different areas of building engineering thanks to its appropriate characteristics. It is obvious that the type of combusted coal has the significant impact on the chemical, physical and mineralogical characteristics of the fly ash and its further utilization.

The paper presents the current trends of coal fly ash (FA) utilization as a secondary/alternative raw material for building materials production, while the typical portion of fly ash in the unit is quantified. Following the amounts of coal fly ash studies presented worldwide, the aim of this paper is specification of high interested areas. The review then includes its using in materials like: ordinary concretes, high volume fly ash concrete, road concrete, autoclaved aerated concrete, geopolymers, ceramic and fly ash bricks, as well. Based on the analysis it is possible to present the building products containing biggest portions of fly ash, thus it shows the effectiveness for achievement of sustainable development ideas.

Keywords: sustainable development, environment, coal fly ash, building materials

REVITALIZATION OF THE DANUBE PORT-CITIES THROUGH TOURISM

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ABSTRACT

The tourism potential in the Romanian sector of the Danube is higher at its extremities (the gorge area and the Danube Delta), where the natural tourism potential is predominant, and it is lower in the rest of the territory, where the anthropic tourism potential is predominant (in port-cities).

The capitalization of the tourist potential of the port-cities and the Danube Valley is generally modest at present. The tourist infrastructure is poorly represented in most cases, being old both physically and morally. What is even more important is that it is not adapted to the specificity of the area - the accommodation, the food and especially the leisure units hardly capitalize or, better said, fail to suggest the uniqueness of the area where they are located.

Keywords: port-city, attractiveness, potential, tourism, harbors, forms of tourism, destination, Danube.

SAMPLE PREPARATION PROCEDURE FOR THE DETERMINATION OF POLYCYCLIC AROMATIC HYDROCARBONS IN DUST PARTICLES

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ABSTRACT

Polycyclic aromatic hydrocarbons are among carcinogenic micro pollutants, which are resistant in the environment. Due to their lipophilic nature and high stability, they accumulate in living organisms and in all parts of the environment. This study focuses on the preparation methods of dust particles for the size fraction below 0.063 mm over the 0,063 mm from the burning slag heap Ema, (the Czech Republic), to determine the concentration of selected PAHs by HPLC with fluorescence detection.

This study deals with the preparatory processes for the determination of selected PAHs by the HPLC method with fluorescence detection. The most important factors of sample preparation include the collection, which is mainly influenced by physical-chemical factors. Samples were collected by a method using a passive barrier between the sampled and the sampling medium. This study also presents a list of extraction procedures used for the determination of PAHs along with the used clean-up and fractionation procedures so as to create the best possible methodology for the determination of PAHs in the studied samples from the burning slag heap Ema.

Keywords: PAHs, extraction methods, sampling, fractionation, purification

**SCIENTIFIC AND TOURISM VALUE OF NATURAL DAM LAKES IN THE
CARPATHIAN MOUNTAINS (ROMANIA). CASE STUDY: RED, CUEJDEL
AND IEZERUL SADOVEI LAKES**

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ABSTRACT

The scientific and tourist value of natural dam lakes gives them a special role within the national earth heritage and good premises for ecotourism and geotourism development. Our paper aims to highlight the scientific value of three Romanian natural dam lakes and to correlate it with the existing approaches regarding the research, planning and capitalization of their ecotourist resources.

Keywords: ecotourism, natural dam lakes, environment conservation, tourism planning.

**SECONDARY LANDSCAPE STRUCTURE CHANGES IN THE DEMÄNOVÁ
VALLEY (LOW TATRAS NATIONAL PARK) DEPENDING ON
DEVELOPMENT OF TOURISM AND POSSIBLE SCENARIOS OF
STRUCTURE CHANGES TO 2022**

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ABSTRACT

The landscape is a certain area of the Earth's surface that is more or less influenced by natural and anthropogenic processes and phenomena. The diversity of the landscape lies in its structure, morphology or area. It is being changed in time and space, i.e. it is under constant development. The goal of the paper is to evaluate the changes of the secondary landscape structure in the Demänová Valley by comparing the historical aerial photographs from 1949, orthophotos from 2007 and satellite images from 2013 verified by the field survey in spring 2014. The examined area had been selected on the basis of historical changes in this area, particularly the rapidly developing tourism industry and related changes. In case of the successful candidacy for the 2022 Winter Olympics in Cracow, the ski slopes of the Jasná resort in the Demänová Valley should host the disciplines of alpine skiing. On the basis of land use planning documentation, we offer prediction of landscape structure changes in Demänová Valley, mainly related to the development of tourism infrastructure.

Keywords: changes of landscape structure, historical and current landscape structure, Demänová Valley

**STUDYING OF PROCESSES OF FORMATION OF
QUALITY OF A SURFACE WATER
IN MODERN CONDITIONS OF CLIMATE CHANGE**

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ABSTRACT

Results of studying of the factors influencing level of pollution of three small rivers are given in the work, located in the various physiographic regions of the Republic of Tatarstan. The list of the priority substances polluting river waters is established. By means of formalized generalized an indicator (an index of impurity of waters) it is shown that, despite essential reduction of outputs, qualities of river waters during 1982 - 2002 years remained at a low level with prevalence to the fourth class of the quality, corresponding the polluted waters. Cyclic nature of change of quality pollution of waters that is explained by influence of the meteorological sizes, the general for the region (air temperature and quantity of an atmospheric precipitation) learned. The received results allow to draw a conclusion on an important role of the meteorological sizes in the course of formation of quality of river waters which river water and an assessment of permissible anthropogenic load on water ecosystems depending on a hydro meteorological mode of the territory can lay down in a basis of the subsequent development on short-term and long-term ecological forecasting of extent of pollution.

Keywords: pollution, climatic factors, quality of water.

SUPPORT OF DEVELOPMENT OF REGIONAL TOURISM IN SLOVAKIA

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ABSTRACT

The article focuses on the issues of development of regional tourism which forms an integral part of the development of individual regions exhibiting relatively strong economic disparities. Multilateral solution to this issue was based on quantitative analyses of tourism in selected regions of Slovakia, identifying potential opportunities to promote development, prediction of their further development with the acceptance of all the principles and sustainable development of the regions, aimed at creating a competitive tourism product. Based on the synthesis of quantitative analyses performed and globalising of their results a management model supporting the development of regional tourism that integrates not only specific aspects of the regions but also the possible positive and negative aspects directly affecting the complex process of self-development is proposed. Thus the proposed model accepts the economic and environmental, legislative, material and technical factors primarily determining the potential of competitiveness of the touristic regions. It also notes the significant economic and environmental potential of brownfields, which form a hidden potential development of the regional tourism of Slovakia.

Keywords: regional tourism, brownfields in tourism, regional tourism, support of regional tourism

**TEMPORAL AND SPATIAL DISTRIBUTION OF RADIOACTIVITY IN THE
SOIL OF THE BLACK SEA COAST IN THE SUPSA-NATANEBI
INTERFLUVIAL REGION (GEORGIA)**

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ABSTRACT

Natural and anthropogenic radioactivity of the environment is of particular interest for ecological researches. The purpose of this work is to characterize radioactivity in the soil of the Black Sea coastal strip in Ureki-Shekvetili zone (Georgia). Measurements were carried out using gamma-spectrometry method. There were identified up to 21 radionuclides in samples of coastal and bottom soil. Mean activity concentration of radionuclides of family Th-232 changed from 4.1 up to 16.3 Bq/kg, family U-238 - from 2.9 up to 17.5 Bq/kg, family U-235 - from 0.2 up to 3.3 Bq/kg. The greatest activity concentration was observed for K-40 (maximal value was 1127 Bq/kg in bottom soil samples). Activity of anthropogenic radionuclide Cs-137 in the samples of coastal soil varied more than by 2 orders - from 1.7 up to 262 Bq/kg; Cs-137 concentration in bottom soil samples is appreciably less than in coastal soil; activity of anthropogenic radionuclide Cs-134 identified in some cases was 0.12 Bq/kg.

Keywords: radionuclides, soil, Black Sea coast

**TERRESTRIAL ISOPODS OF THE MINING LANDSCAPE
(DOLNÍ SUCHÁ, CZECH REPUBLIC)**

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ABSTRACT

This study is focused on terrestrial isopods (Isopoda: *Oniscidea*) of chosen sites in the mining landscape in the area of Dolní Suchá village and tries to determine the response of isopods to country impacted by mining. Isopods were collected by pitfall traps and by individual collecting (using tweezers, aspirators) on three segments with various utilizing of landscape (the sites with ruderal vegetation, the sites with agricultural reclamation and the gardens). Altogether eight species of terrestrial isopods were found from 324 collected individuals with a strong dominance of species *Ligidium hypnorum*.

The research has shown the preference of heterogeneity over homogenous landscape. The abandoned area with richness of microhabitats was the most favorable for terrestrial isopods. Over 74 % of obtained individuals were found at this area with occurrence of all found species.

Keywords: post-industrial sites, ruderal vegetation sites, *Ligidium hypnorum*

THE ANALYSIS OF THE SPATIAL STRUCTURE OF THE PATCHES IN THE POPRAD BASIN (SLOVAKIA)

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ABSTRACT

The Poprad basin plays an important role in the Slovak Republic and it is one of the most densely populated basins in the Slovakia. For this particular aspect, a man greatly influenced the development of the landscape structure. In the examined period, the appearance of the basin as well as the proportion of individual elements was significantly changed. Chronologically, with regard to the relevant map bases, we observed the development of the landscape structure from 1785 to 2010. The aim of this paper is to analyze long-term changes in the structure of the individual patches on the basis of vector layers of the landscape structure. For the analysis, we used the Patch Analyst proprietary software that creates an extension of Arc GIS 10 software. Particularly from an environmental point of view, the knowledge of trends in the landscape structure as well as the specific characteristics of its various patches is important for the further development and direction of the examined area.

Keywords: Poprad basin, development, country, landscape structure, patches

THE BASIN APPROACH TO THE ANTHROPOGENIC IMPACT ASSESSMENT IN OIL-PRODUCING REGION

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ABSTRACT

Basin approach used to estimate impact of oil and gas industry on the environment and to develop solutions for natural resources optimization on the study territory. The main objective was to find effective methods of analyzing spatial and temporal patterns of geosystems functioning under strong anthropogenic pressure. The complexity of natural systems and the need to integrate large number of factors required the use of modern methods of geoinformatics, information technology, mathematical and cartographic modeling. 713 watersheds of 2-3 orders allocated in the region of JSC "Tatneft" for the purpose of spatial analysis. Weighted scores method with extensive involvement of GIS spatial analysis used for an integrated anthropogenic disturbance assessment within the elementary basins. As a result, "Map of cumulative anthropogenic impact" and "Integral environmental assessment map" were built. "Map of cumulative anthropogenic impact" allows through the selected parameters to identify the impacts caused by agricultural activity and "Integral environmental assessment map" – oil and gas industry impact on the environment. A technique for quantifying of different sectors of the economy contribution to human impact on the certain components of the landscape realized by the example of forest vegetation. Methods of forest separating fragmentation by road network (transport) and linear facilities of the oil industry study allowed evaluating of their contribution to overall level of human impact.

Keywords: Basin approach, anthropogenic impact, integrated assessment, spatial analysis, geographic information systems.

THE CETĂȚENI GEOMORPHOSITE (ARGEȘ, ROMANIA). GEOMORPHO-CULTURAL ASSESSMENT AND TOURISM VALORIZATION

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ABSTRACT

The natural reserve from Cetățeni (Cetățeni Gorges or Cetățeni karstic microrelief) is located in the extreme south of the Leaota Mountains, on the left side of the Dâmbovița River, in the Cetățeni village. The spectacular physiognomy of this relief with sharp peaks, columns and rock pedestals are mainly the result of the selective erosion of the conglomerates. Natural conditions have favored the development of an interesting flora of numerous endemic and thermophilic elements specific to the South. Situated between the Coman and Chiliilor creeks, it is enriched by its cultural-historical significance revealed through archaeological research (evidence of habitation dating from the beginning of the Bronze Age, a Geto-Dacian settlement, Proto-Bulgarian habitation, Romanian medieval fortress and settlement). Cetățeni is an important touristic location in the Dâmbovița Valley, however, the main attraction is the new *Cetățuia Negru Vodă* Orthodox Church (built near “Schitul lui Negru Voda” - hermitage carved into the rock dating from the 15th century), recently integrated into the landscape and cultural spectrum of the area. In this context, the aim of this paper is to provide a geomorpho-cultural assessment of the Cetățeni geosite, emphasizing the cultural-historical elements, which have become complementary parts of the valorization of this landscape and spiritual resource in its entirety. This new resizing of the geosite also imposes different parameters in the development of protection and valorization strategies because, under the pressure of natural and anthropic factors easily noticeable in the study area, ignoring them can lead to the disappearance or destruction of a source of genuine cultural and scientific touristic potential.

Keywords: geomorphosite, touristic potential, geomorpho-cultural assessment, Cetățeni

**THE COROLOGY, ECOLOGY AND PHYTOSOCIOLOGY OF THE SANDS
PLANT COMMUNITIES AND NATURAL HABITATS IN THE SANDY AREA
FROM DABULENI, DOLJ COUNTY –ROMANIA**

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ABSTRACT

The thematic area is situated in the surroundings of Dabuleni, in the Southern part of Oltenia, South-East in Dolj County, near Bechet bridge, in the Danube meadow, in an area with sandy soil called "The Oltenia Sahara". In the named area meadows and plains covered with sandy dunes can be encountered. The total surface of the sands in the Southern part of Oltenia is over 140,000 ha, being represented in stripes of different lengths along the Danube banks and on the left bank of the river Jiu. The biotic conditions on the sandy soils in Oltenia allow the existence of some special plant communities. The natural habitats present a specific structure and house a varied fauna. In the sandy area of Dabuleni there are over 400 vascular species, from which some are rare, being included in the red lists. From the floral point of view, the sands from Oltenia, Dabuleni area are different from the sea sands. The herbal vegetal associations from this thematic area are classified as: meadow plant communities, rural pasture, desert areas in locust tree plantations, aquatic associations in the Danube meadow, ponds and surroundings. As far as the ligneous vegetation is concerned, the most important vegetal communities are *Bromo sterilis-Robinetum* (Pócs 1954) Soó 1964 [13]. The growth and development of spontaneous plants and those planted on the sandy soil present something specific to those ones, compared to other types of soil. These species are to be found in European Directories Natura 2000 and on the red lists in the whole country. Cataloguing these natural capital and establishing coherent management measures in this area which have already suffered huge transformations due to the eco-climat changes, will lead to a better management and preservation of the area.

Keywords: sandy area, corology, ecology, phytosociology, sands plant communities, natural habitats, Dabuleni

THE DIVERSITY OF URBAN GREEN INFRASTRUCTURES IN A FORMER INDUSTRIAL CITY IN ROMANIA. CASE STUDY - RESITA

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ABSTRACT

Industrial cities from post-communist countries have been confronted in the past 20 years with significant changes in their both functions and structure, due to processes of industrial restructuring, social changes, development of residential and commercial areas. This is the case of the municipality of Resita – Caras Severin County in Romania, a former industrial city. All this changes determined an increasing environmental pressure, thus the need for local authorities to find measures of balancing the negative effects of development through urban green infrastructures. In our analysis, we have used direct field observations, statistical data from local authorities and information derived using GIS techniques from maps and aerial images. We created a classification of urban green infrastructures present in the city of Resita, assessed their connectivity and benefits, and calculated a series of indexes expressing their distribution and efficiency. This analysis can represent a starting point useful in the urban planning for a sustainable development.

Keywords: urban green infrastructures, sustainable cities, urban ecology, post-communist, Romania

THE EFFECTIVENESS OF A LOW HEIGHT NOISE BARRIER

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ABSTRACT

Due to the ever growing demands for health protection from the adverse effects of noise and vibrations, the production of various types of noise control measures has been rising. In the spring of 2013, a low height noise barrier (LHNB) was used along a railway line in the Czech Republic for the first time. This barrier was placed along a 214 m long test section of a railway track (No. 520 A) in Prague – Hlubočepy. The study (Analysis of the Effectiveness of a Low Height Noise Barrier along a Section of the Hlubočepy – Rudná Railway Line) included the evaluation of the effectiveness of the low acoustic screen in terms of noise emissions in the respective area.

Direct in-situ measurement at two measured points of the investigated section along a railway line was performed before and, successively, after the installation of low height noise barriers. The measured values of equivalent A-weighted sound pressure levels L_{Aeq} were used to determine the acoustic effectiveness of the newly built low noise screen. Furthermore, the investigated area was simulated in the LimA prediction software. The output from the LimA software were numerical values of equivalent A-weighted sound pressure levels L_{Aeq} computed at individual points for a situation without and with the use of the low noise screen. The values obtained from the LimA prediction software were subsequently compared against the direct in-situ measurement data. The resulting values served to determine the LHNB effectiveness within the investigated area.

Keywords: Noise control measures, Low height noise barriers, Effectiveness evaluation, In-situ measurement, LimA software

**THE FUNCTION OF WETLAND AND AQUATIC VEGETATION IN THE
MINING LANDSCAPE OF THE UPPER SILESIA**

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ABSTRACT

Water in mining areas has amended the chemical composition or water are dirty. For solution these problems after mining are proposed remediation measures appropriate to manage all landscape changes. In the Upper of Silesia was developed due to mining subsidence basin drainless - aquifer subsidence trough. Mining subsidence reservoirs have increased salt content which adversely influence the biodiversity of fauna and flora in the affected areas. High salt content is also influence by dissolved substances. One way like reduce the salinity of mining subsidence through is use of phytoremediation due halophytes. Halophytes may reduce the salt content in the waste water due to the accumulation of salts in their tissues. In Upper Silesia was examined 10 mining subsidence trough. In mining subsidence reservoir was detected mainly their conductivity, ie. indicator of salinity. Here was conducted monitoring water and littoral vegetation and their possible effect on the conductivity of mining subsidence reservoir. During the monitoring has detected 115 littoral and 28 species of aquatic plants. Plants are able to reduce and gradually degrade chemical pollution caused by underground mining and secondary manifestations.

Keywords: mining subsidence through, wetlands, conductivity, salinity

**THE GEOSYSTEM BASIS ENVIRONMENTAL OF SAFE DISPOSAL OF THE
OBJECTS OF MINING COMPLEX**

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ABSTRACT

The choosing an optimal placement (place of disposal) of industrial facilities should be carried in accordance with the peculiarities geosystem of territory organization. The object of analysis is the river basin, the subject - environmental sustainability of geosystems. The upper parts of the river basin are the most favorable for the placement objects of a mining complex. The maximum gravity gradient flow of surface water and groundwater to provide the best for the geosystems leaching regime. one is decreased the possibility of accumulation of saline groundwater and increase the area of pollution. In the dilution of saline waters involves the entire surface and underground catchment the geosystems

Keywords: geosystem, river basin, stability, environmental safety, industrial facilities, pollution

THE INFLUENCE OF CEMENT DUST FROM LAFARGE PLANT TARGU JIU ON NEARBY SOILS PROPERTIES

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ABSTRACT

The studied land is located within the Northern part of Oltenia Region, between mountains and SubCarpathian Hills that is firmly individualized by its characteristics. The Lafarge Cement Plant from Targu Jiu that is present within the area represents, along with Rovinari Power Plant, a source of high pollution in Gorj District. The presence of cement dust is evident within this area on either small or large areas in function of wind direction and other atmospherically conditions yet the soil pollution highly depends both by the distance from the pollution source and by the intrinsic characteristics of each soil type. Researching the soil properties inside this zone in dynamics, during 5 years, there were established 19 points from where there were taken soil samples on two depths, 0-20 and 20-40 cm. The points were located on both sides of the cement plant on the direction of the main air currents. The determinations allowed to establish the distance the cement dust is carried away, the most affected directions of cement dust transport as well as the changes the dust produces on soil properties. There can be observed that more obvious changes, due to cement dust pollution have been recorded with: soil reaction (pH values); the bases exchange capacity (BEC, me/100 g soil) and bases saturation degree (BSD, %), and less for the other chemical features. There can be observed that the highest influence of cement dust on soils was recorded around cement plant on a radius of approximately 3 km. In the W part the influence was recorded up to 15-20 km and in the eastern part, up to 5-8 km. Due to the fact that the studied area is complex as regard the soil types, in order to emphasize the influence of leaching and accumulation of cement dust there were made determinations into the area of maximal depositing.

Keywords: depresiune subcarpatică, praf de ciment, sol, profil de sol, poluare, pH, capacitate de schimb pentru baze, grad de saturație în baze

THE INFLUENCE OF THE GEOLOGICAL SUBSTRATUM ON THE CHARACTERISTICS OF AGHIREȘ MINING LAKES, ROMANIA

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ABSTRACT

Within the mining area from Aghireș, Romania, the exploitation activities of quartz-kaolin sands and brown coal induced environmental disruptions, especially regarding the geological, geomorphological and hydrological components. The quarry exploitations led to the formation of several artificial water-bodies, referred to as mining lakes in this paper. These lakes may offer a great potential for the whole mining area in case of rehabilitation. The present study aims to identify the main physical and chemical characteristics of existing mining lakes, and to determine the influence of the geological substratum on them. As methods of analysis, both on-site and laboratory testing have been used. The final results confirm the initial premise that the water quality is influenced by the geological substratum, especially regarding the dissolved compounds and the concentration of hydrogen ions. In this respect it has been observed that three of the ten investigated mining lakes have an extremely acidic water environment (with pH levels lower than 4.0), while the rest have neutral pH levels. This is explained by the presence of coal deposits associated with pyrite in the underlying formations of acidic lakes. In fact, acidic waters are quite frequent in areas with underground coal resources. In correlation with other environmental impact studies, the outcomes of the present one will facilitate the development process of the most appropriate rehabilitation strategies for the investigated mining area.

Keywords: mining lakes, geological substratum, physical and chemical analyses, quartz-kaolin, Aghireș, quarry rehabilitation

**THE NATURAL ENVIRONMENT AS AN ELEMENT OF SUSTAINABLE
DEVELOPMENT IN NORTH-EASTERN POLAND**

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ABSTRACT

The natural environment is a very important element of sustainable development. High nature value is a factor that often contributes to conflict between users of space. In the process of social and economic development, efforts should be made to prevent the degradation of the natural environment. This paper characterizes the potential of the natural environment in line with the principles of sustainability in North-Eastern Poland covering the Region of Warmia and Mazury and the Region of Podlasie. The analyzed regions are characterized by a high degree of naturalness, diverse relief, an abundance of lakes, extensive forests and rich flora and fauna. With the exception of one constituent municipality, North-Eastern Poland is part of the area referred to as the Green Lungs of Poland, which covers the most attractive natural sites in the country. The ecosystems in North-Eastern Poland are recognized for their uniqueness not only in Poland, but also across Europe, and the Białowieża Forest has been designated a UNESCO Biosphere Reserve. The main source of information for this analysis was the data supplied by the Central Statistical Office in Poland. The aim of this study was to identify areas with the most valuable natural sites and to propose directions towards sustainable development.

Keywords: natural environment, sustainable development, ecosystems, North-Eastern Poland.

THE OCCURRENCE OF AMPHIBIANS AT SELECTED MINING SUBSIDENCE RESERVOIRS OF UPPER SILESIA

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ABSTRACT

The article deals with the occurrence of amphibians in the mining landscape of Upper Silesia. The survey was conducted during 2013 as part of the sub-project SV511 33 F1. For research, eight locations of so called flooded mining subsidence, as consequences of mining activities, were selected. In addition to monitoring of amphibians, chemical parameters of water were also measured with YSI Professional Plus (pH, conductivity, dissolved oxygen, barometric pressure and water temperature). In total, six species of amphibians were detected on selected sites. Subsidence in the basin of Upper Silesia are known for their increased salinity, which has been demonstrated in previous research in 2013. Although the conductivity value exceeded 1500 $\mu\text{S}/\text{cm}$ in some locations, these sites were revived by all life stages of amphibians.

Keywords: amphibians, flooded mining subsidence, Upper Silesia, conductivity

THE POPULATION'S PERCEPTION OF THE ENVIRONMENT'S QUALITY IN TÎRGU MUREȘ

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ABSTRACT

The city of Tîrgu Mureș is one of the most important urban centres of Transilvania, who has developed due to the transports and the chemical industry (chemical fertilizers and drugs). In order to evaluate the population's perception of the environment's quality in Tîrgu Mureș. There has been made a survey on a representative sample, for a population of 111 321 inhabitants over 20 years old, with a maximum admitted error of 5% and a confidence level of 95%. The questionnaire has been ongoing for two months. The next aspects were taken into consideration: the environmental quality in the town of Tîrgu Mureș, the environmental quality in the neighbourhoods of Tîrgu Mureș and informations referring to the environmental quality (sources, categories). The differentiations depend on criterias such as age, gender and level of education. The research concerning the quality and the functionality of the environment in Tîrgu Mureș has come to the conclusion that the health state and mental comfort are strongly conditioned by the environmental quality.

Keywords: Urban population, environmental quality, environmental functionality, differentiations.

THE ROLE OF NATURAL AND SPEOLOGICAL RESERVATION OF THE SUGAU CAVE (ROMANIA) AS GEOTOURISTICAL RESOURCE

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ABSTRACT

The mountain region offers a spectacular view and scenery for all visitors, but not all attractions are above the surface. This is the case of our study, to show, that the Hasmasu-Mare, Cheile Bicazului National Park attracting lots of tourists, but just around the bend, at a stone-throw of the main road lies the Sugau Cave natural reservation and protected area, with breathtaking scenery. In this article we will try to present how this attraction did become one of the main visited areas of the region, and how and why influences the tourism circuit of the region and of the whole county. The cave being known for the native population for the sound it made, was first a shelter, then refuge place in tensioned times during history. But after the 1930's started to become more and more. It went through different phases of maintenance and shape changes, it was endangered due to unprofessional handling, but after 2006 in the custody of a group of skilled and good intentioned men, it is regaining its worthy place among the most visited sites of the Giurgeu Basin.

Keywords: geotourism, protected area, cave preservation, sustainable management, custody, calcite

THE ROLE OF RURAL TOURISM IN THE SOCIAL AND ECONOMIC REVITALISATION OF LĂPUȘ LAND (MARAMUREȘ COUNTY, ROMANIA)

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Assoc. Prof. Dr. Marin Ilieș, Assoc. Prof. Dr. Gabriela Ilieș,
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ABSTRACT

This study highlights the main results of a larger study on rural tourism in Lăpuș Land (partly a mining area) and aims to provide an assessment of the present stage of rural tourism development in this region. The analysis is focused on the regional and local level by using the survey method. The purpose is to reveal social and spatial relations and to present a realistic image of the situation of rural tourism in Lăpuș Land. It presents the main results of a field investigation using the questionnaire technique applied directly, by means of operators, upon a sample made of 25 households in 11 settlements in 2012. Finally, the main conclusions and the main perspectives for rural tourism development have been drawn. Taking into account the level of the coordinates defining nowadays the size and quality of the general infrastructure, of the involved accommodation units, the services provided, as well as the volume and intensity of tourist flows, the rural tourism activity cannot generate on the short term a spectacular economic revival of Lăpuș Land, except for a relatively low number of households.

Keywords: rural tourism, mining area, field survey, Lăpuș Land, Maramureș, sustainable tourism.

**THE STRUCTURE AND TEXTURE OF THE TERRACE SEDIMENTS OF THE
MUREŞ RIVER AND THEIR ROLE IN DISPERSING ORGANIC
POLLUTANTS**

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ABSTRACT

This paper presents the reflex of the direct correlation between the Transylvanian Depression's tectonics and lithology (the inter-Carpathian depression of Romania), the laying of the terrace parts in the morpho-hydrographic basin of the Mureş, the structure and texture of the terrace sediments and the dispersion of the organic pollutants.

The morphology of the terraces, the granulometry, the slope and their depth are premises in storing and dispersing the organic pollutants. The slope of the terrace sediments and the in situ pressure, alongside the physical and chemical properties of the contaminating agent determine the pollutants' area of dispersion.

The analysis and the evaluation were according to the data obtained from seasonal rhythmic drillings. At the same time, crisis situations induced by increased rainfall or severe drought, as were the accidents which came to pass due do careless usage of fuel or the precarious state of the installations and the storage and distribution equipment.

The working methodology meant first and foremost identifying the polluted sites, locating the drilling perimeters, taking samples of the polluted area, analysing the specific type of pollutant. The taking of samples (through drilling), their laboratory analysis and the identification of the main types of pollutants created the data-base used throughout the scientific process. The analysed pollutants were: aliphatic hydrocarbons (TPH-GC), aromatic hydrocarbons (BTEX) and heavy metals (Pb, Cu, Ni, Zn).

The intrusive investigations, done through dry drilling technology, with protective tubing, were made in the area of former locations of fuel deposits which are the main sources of pollution of the aquifers and the soil. The matrix analysis of the correlations between the type of sediment and the area of pollution was made through GIS methodology.

The study confirms a relation of inter-dependence between the structure and texture of the sediment and the dispersion area of the pollutant, horizontally and/or vertically, materialised through dispersion maps of the contaminating agent. The contaminated or the potentially contaminated perimeters were evaluated and hierarchized according to the negative impact generated by the pollutant, related to the structure and texture of the fluvial terrace sediment of the morpho-hydrographic basin of the Mureş River.

Keywords: terrace sediments, pollutants, storage, dispersion, Transylvanian Depression

THE USAGE OF LOCAL AND INDIGENOUS KNOWLEDGE IN THE MANAGEMENT OF GEOTOURISM DESTINATIONS

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ABSTRACT

The contribution deals with the importance of knowledge, skills and traditional lifestyles of local and indigenous peoples for the management of geotourism destinations, ie. destinations with distinctive, scenically attractive and scientifically valuable landscapes. For example, these may include geoparks, protected areas or UNESCO World Heritage sites. It focuses on the analysis of the level and form of usage or at least the respect for this know-how passed from generation to generation and for other elements of collective memory of these destinations. The authors presume that the quantitative and qualitative level of usage of this traditional know-how in geotourism destination management correlates positively with the long-standing sustainability of these environmentally sensitive destinations. Secondary data (eg. geoparks' annual and revalidation reports) as well as primary data (brief questionnaire) were used to verify this hypothesis.

Keywords: indigenous knowledge, indigenous peoples, geoparks, geotourism, sustainability

**TYPIFICATION AND REGIONALISATION OF THE DISPERSED
SETTLEMENT IN THE LOCAL AREA OF THE TOWN KRUPINA
(SLOVAKIA)**

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ABSTRACT

Historical landscape structures represent specific, time limited and spatially shrinking subtype of landscape structures as a whole. They have fragmentary nature and are remains from the former continual landscape. Such landscape elements create mosaic structures of extensively used small-scale landscape features of arable lands and permanent agricultural crops respectively currently unused areas with low degree of succession. The research of the secondary landscape structure brings a wide range of options of interpretation so in the relation to the vertical, resp. topical as well as horizontal landscape features. The aim is to assess developments and changes of secondary landscape structure of the rural settlement in the restricted area of Krupina with regard to the processes of changes for definite period of time between 1987 and 2013. To the partial procedures that led us to the achievement of the given aim belongs the development of landscape-ecological characteristics of the primary, secondary and tertiary landscape structure of the area defined. The base was the LANDEP methodology, on that base it is assessed the secondary landscape structure on the level of groups of landscape elements and ways of using the country. We have created mosaics of the landscape structure on the basis of which the typology of dispersed settlement in 1987 and 2013 has been formed. They have been arranged into four types (A, B, C, D) by the combination of basic landscape elements of landscape structure. The regionalisation has been developed in two time periods as well. Two regions (agricultural and forest) and seven sub-regions have been defined. The result of the above mentioned is the evaluation of the development and the transformation of the area being observed, proposals for the maintenance of the dispersed settlements, recommendations for the dispersed maintenance and trends of the dispersed development.

Keywords: landscape structure¹, Landep methodology², dispersed settlements³, mosaics⁴, regionalisation⁵.

VULNERABILITY OF DIAPIRIC REGIONS UNDER THE IMPACT OF ANTHROPIC ACTIVITIES. CASE STUDIES IN ZAKARPATTIA (UA) AND THE TRANSYLVANIA DEPRESSION (RO)

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ABSTRACT

The rock-salt deposits of the Transylvanian Depression (Praid, Sovata, Turda, Ocna Mureş, Ocna Dejului, Sic, Cojocna, Sărăţeni, Jabeņa, Ideciu) and the Maramureş Depression (Zakarpattia region, Solotvino) have been known from times long past, since the exploitations done by the Agatyrsos, the Dacians and the Romans. Salt mining in Transylvania was stopped in the first half of the 20th century, due to reasons of economic efficiency: Sic (1822), Ocna Sibiului (1932), Sovata, Cojocna (1852), Jabeņa, Ideciu etc. Solotvino declined after 1998 as well, in the absence of a firm demand for salt on the Ukrainian market. The abandonment of the exploitation resulted in mine flooding and in 2013 the first consequences became visible, through collapses in the perimeter of mine shaft 1, endangering the inhabited neighbourhoods from the west part of Solotvino. In Transylvania, Ocna Mureş was affected by similar hazards in the winter of 2010 (December 22-25), due to the increasing vulnerability of the ancient Roman salt mines to the flooding of the Mureş river. The floods occurred both naturally and artificially (starting from 1978). The methodology used in this paper consisted in identifying the vulnerable perimeters of the diapiric areas to anthropic activities (urban constructions, road and railway infrastructure), the analysis of the intensity and frequency of collapse processes, the evaluation of the vulnerability and generation of vulnerability maps, estimation of collapse risk.

Keywords: diapiric areas, anthropic impact, vulnerability, hazard, risk.

WASTE DISPOSAL BY RISK ANALYSES IN ZOHOR LOCATION

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ABSTRACT

Method of risk expression for waste disposal as the potential pollution sources is presented in the paper. There are numerous environmental problems caused by waste disposal. The paper deals with risk analysis, applying it, solutions, procedures and final results and it shows the importance of risk analyses in all technical and environmental fields. The method is based on risk scores assigning for the technical and environmental parameters as a result of preliminary risk assessment conducted on each parameter. The specific data connected with the waste disposal end environmental and technical parameters are used. Case study of this paper will explain their importance and methods nowadays.

Keywords: Environmental Protection, Risk Analysis, Sanitary Landfill, Waste Disposal, Waste Management

WATER MANAGEMENT OF LANDFILLS: A CASE STUDY OF MSW LANDFILL IN ZOHOR

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ABSTRACT

When designing a landfill, it is necessary first correctly define the impacts of deposited waste on the environment. Each landfill site is exposed exposure to rainfall. The principle is, these waters promptly lead away from the landfill and reduce their influence to sealing. The purpose of the water management of landfill is preventing discharge of polluted waters, capture them and dispose them. Quantity of leachate is a critical parameter in the design of landfill construction. Created amount of leachate influences the way how to capture, collect and process the leachate. This study aims to investigate water management in the open MSW landfill in Zohor. This article presents the estimate of the quantity of leachate in the landfill body by means of the HELP model. In resolving that issue, it's important to design optimal water regime of landfill order to ensure the elimination of potential environmental pollution.

Keywords: Water Management, Drainage System, Leachate, Landfill, Impacts

**YOUTH' ATTITUDE TO ECOTOURISM DEVELOPMENT IN ROMANIA.
CASE STUDY: MEHEDINTI COUNTY**

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ABSTRACT

In the wake of the climate changes of the past decades, people have become aware of the impact of pollution on the environment. As a result, the marketing activity has emphasized the protection and conservation of natural resources. This has led to the emergence of ecotourism as the form of tourism which allows for the superior knowledge, appreciation and conservation of nature. In addition, this form of tourism introduces tourists to the local cultures and traditions available at the tourist destinations.

The present paper aims to identify the youth's perception of ecotourism development at the level of micro-destinations (in this particular case Romania, the Mehedinti county). This has been gauged through quantitative research intended to identify the opinions of a significant emerging market segment, that is the youth and their perceptions of ecotourism as implemented at the level of the micro-destination under analysis. The practical relevance of the approach lies in the fact that the results obtained will be employed in the development process of the ecotourist strategies of the destination under focus.

Keywords: ecotourism, Mehedinti county, ecotourist destination.