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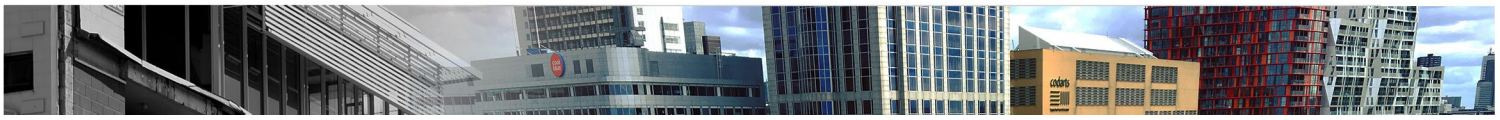

# DISASTER RISK REDUCTION FOR SUSTAINABLE SOCIETIES

## 12th International Conference
## Environmental Legislation, Safety Engineering and DIsaster MAnagement
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# DEVELOPMENT OF ALGORITHMS FOR NEAR REAL TIME WARNING ON THE ATMOSPHERIC POLLUTION EVENTS

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## ABSTRACT

The current study is part of the research aiming to setup a warning system over atmospheric pollution events based on observations by remote sensing instruments. In the first stage, level zero data from an operational CHM15k ceilometer (Lufft) which works continuously is used to a) read error codes from instrument raw data file in order to monitor instrument's parameters if any of them is outside the range of well-functioning, a warning is sent to the person responsible for ceilometers in order to take action and remedy the problem| b) create quick looks of Range Corrected Signals (RCS) and visualize on INOE website in NRT (15 min) along with other instruments. These images represent a time-range visualization of the backscatter laser power, which bring information about atmospheric structure and composition (molecules, aerosols and clouds).

In the second stage, an algorithm of detecting layers of atmospheric pollution is developed. Once operational, when a pollution layer is observed, an automatic warning will be sent to specific scientists (c). Then, the data from a photometer (available on Aeronet site) is checked as well as the image/information from an all-sky-imager. If large values for AOD (aerosol optical depth) are observed while the sky imager reveals a potential pollution overcast, a warning is sent to specific scientists (d). The next step implies the switch on continuous measurements of the relevant research instruments (e.g. multi-wavelengths Raman lidar) (e).

Please note that, in cases when pollution events may be entrained in the PBL (Planetary Boundary Layer), the operational insitu instruments will be monitored as well. Further steps in pollution quantification will be approached by using the retrievals of the aerosol optical properties using the multi-wavelength Raman lidar which provides information on aerosol typing. Under specific assumptions, mass concentration can be evaluated. This stage will be developed on research mode while the NRT option is exploited. The current status of the steps within the two stages is presented during conference. We aim to be able to reach step (c) in two-three months while the entire process shall be ready by November 2018. The steps d) and e) will be initially human based but the automatization is envisaged (at least for d)). Please note that two CHM15k ceilometers were deployed at INOE in February 2018. The solar and lunar photometers are operational for several years now while the all-sky-imager is operational since 2017.

# SUPPORT TOOLS FOR LAND USE POLICIES BASED ON HIGH RESOLUTION REGIONAL AIR QUALITY MODELLING

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## ABSTRACT

Air pollution is becoming a stringent issue, especially in large urban agglomerations like Bucharest, Romania. National and European air quality regulations are focusing on enforcing emission and imission limit values, but there is a poor correlation between air quality policies and land use policies, both critical to urban development.
The current study focuses on the integration of high resolution regional air quality modelling data for key pollutants like $PM_{10}$, $SO_2$ and $NO_2$ with land use datasets. This approach is based on two major tools: the Urban Atlas Project's land use classes and the WRF-Chem air quality model. Through overlay analysis of the air quality model output and land use datasets, it is possible to derive two major types of information: 1. the land use area and classes exposed to certain pollutant concentration intervals and 2. the variability of the exposed land use classes according to the air pollutants source – receptor dynamics.
Results are presented in the form of two case studies from September 2014 for Bucharest, Romania. In the first case study, three $PM_{10}$ classes were set up in order to demonstrate the possibility to identify land use classes exposed to certain intervals of $PM_{10}$ concentrations and their extent. The second case study focuses on the land use classes and their extent exposed to $SO_2$ and $NO_2$ concentrations in two different meteorological scenarios during two days in September 2014.
This approach could be used by policy makers in the decision making process, providing them with more informed decisions regarding future destinations of different land categories taking into account air pollution data. This study also opens the way for future air quality satellite data (ESA Sentinel 5-P and 5), with resolutions similar to the air quality model outputs to be used in land use planning and policy development purposes.

*Keywords*: land use classes, atmospheric pollution, air quality modelling

# MAPPING INDOOR AIR POLLUTION DURING SUBWAY TRANSPORT IN LILLE, NORTHERN FRANCE

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## ABSTRACT

Networks of fixed located monitoring stations assess the air quality and pollution levels, which are well standardized at the international level. However, there is limited information concerning the indoor air pollution inside frequently used subway system. Such studies are usually done during specific measurements field campaigns with the aim of mapping the air quality and pollution levels underground.
In our work, we investigate particulate matter concentrations of various size fractions, namely $PM_{10}$, $PM_{2.5}$, and $PM_1$ by on-board measurements inside 42 metro stations and during transportation within them, in Lille metropolis, northern France. The instruments used for determining PM concentrations were a low-cost sensor (OPC-N2, Alphasense) and an optical particle counter (miniWRAS$^{TM}$, Grimm Aerosol Technik GmbH). We found that $PM_{10}$ concentrations during transportation varied between 30 and 100 $\mu g/m^3$ and were 3 to 10 times higher than outdoor of the subway platform (~ 10 $\mu g/m^3$). We also observed an increase in number concentrations of ultrafine particles during transport in the subway train compared to outdoor measurements. On-board measurements indicate that human exposure to particulate pollutants can be quite variable depending on the number of people (e.g. crowded at rush hours, deserted at off-peak times) and on the confinement space (e.g. indoor on subway platform, indoor in subway train, outdoor urban area). Real-time monitoring of air quality in busy underground environment and publicly available information would be of real use.

*Keywords*: PM, mass concentration, on-board measurements, underground, low-cost sensors

# THE ASSESSMENT OF MINERAL DUST AS A PRECURSOR FOR CONVECTIVE CLOUDS WITH HAIL IN SOUTH-EASTERN EUROPE

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## ABSTRACT

It is unanimous recognized that mineral dust particles play a major role as cloud condensation nuclei (CCN) and ice nuclei (IN) activation during the cloud formation. Also, the long range transport of dust allows the contribution of dust aerosols in cloud processes away from the source areas. Several studies have demonstrated that the atmospheric environments contaminated with mineral dust aerosols could produce systematically enhancements of convective clouds.
Although these experiments had emphasized the influence of dust intrusions on atmospheric stability with focus on deep convection and precipitation enhancement and/or suppression, important convection-related events such as hailfalls were not studied yet. However, taking into account that hailfalls are among the most significant meteorological hazards with great socio-economic impact, these events deserve much more attention.
Within the Euro-Atlantic region the long range transport of mineral dust is determined by the displacement of tropical air masses from Saharan regions covering large parts of Europe and Mediterranean area. This study aims to clarify whether the Saharan dust has any influence on hail occurence during the convective processes and to what extent the mineral dust presence influence hail size. We have focused our attention on a particular situation: a Saharah dust outbreak coupled with severe convective episodes with hail occured in the Central and Eastern Europe during 16$^{th}$ and 23rd of June 2016. The events were analysed using the synergy between ground-based measurements and observations and modelling. First results emphasize that the presence of dust in lower and medium troposphere has influenced the enhancement of deep convections, raising the questions regarding the role of mineral dust as a precursor of hail formation.

*Keywords*: dust monitoring, dust-clouds interactions, precursor, hail

# A COMPARISON OF HEAVY METALS CONCENTRATION IN SOIL AND VEGETATION BETWEEN TWO PROTECTED AREAS

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## ABSTRACT

Chemical properties of soil and fir tree needles may depend on several factors, natural and anthropic, acting at different spatial and temporal scales. The aim of this paper is to evaluate the magnitude of heavy metals pollution in a protected area affected by the coniferous drying compared to an unaffected area, in Vanatori Neamt Nature Park.
For this study, 144 samples from the affected area, named the impact area, and 24 samples from a nearby area that did not show any signs of drying, named the control area, were analyzed. The concentrations of three metals (Cu, Cd and Pb) from soil and fir tree needles were analyzed. Lead and cadmium are the major heavy metals resulting from combustion and are often associated with zinc due to the wear of road tires. The analyzed samples were from the surface (0-20 cm) and depth (20-30 cm) soil and current year and previous year samples of needles.
The Cu concentration of soil in the impact area is largely included (93%) within the range of normal values, with only 7% samples reaching the alert threshold. In the control area, 100% of samples have normal values. Almost half (44%) of dry needles samples are below the minimum accepted level. In terms of Cd concentration of soil, 61% of samples have normal values in the impact area and 39% are included between the normal range and the alert threshold. In the control area, 50% of the samples have normal values and 50% of the samples are included between the normal range and the alert threshold. The Cd concentration of needles is higher in the control area compared to impact area. Also, in current year needles, Cd have higher values than previous year needles. The concentration of Pb is higher in surface soil samples compared to depth soil samples. The current year needles have lower Pb concentrations than previous year needles. In terms of Pb concentrations of soil, 36% of impact area samples have normal values, and 64% are included between the range of normal values and the alert threshold. In the control area, 25% of the samples have normal values, and 75% of the samples are included between the normal range and the alert threshold.
In conclusion, the metals concentrations exceed the normal limits both in soil and needles samples. These concentrations exceed the normal limits also in the control area, which means that heavy metal contamination is not the cause of coniferous drying.

*Keywords*: heavy metals, protected areas, coniferous drying, soil, needles.

# CHEMICAL STATUS OF THE DANUBE RIVER BASIN WATERS ON ROMANIAN TERRITORY BY ASSESSING THE PRIORITY SUBSTANCES - HEAVY METALS

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## ABSTRACT

There is a series of legal measures at european level against surface waters chemical pollution, set out in Water Framework Directive (2000/60/EC) (WFD). The EU-list, annex of the WFD, contain those substances that present a significant risk to human health via aquatic environment, known as priority substances. For a long time, the Danube River Basin (DRB) waters quality showed a significant variability in terms of priority substances due to the diverse human activities, especially mining activities. This research paper aimes to assess the chemical status of the DRB waters located on Romania territory regarding heavy metals such as Pb, Cd, Ni, Cr, Cu, and Zn by analysing water and sediment samples from different areas (south-west and north-west of Romania). Based on the obtained results by evaluating the quality elements, the water chemical status of DRB achieved a good chemical status for 26% of water samples and 47,5% of sediment samples. Also, the basic statistic and multivariate analysis were used to explore the relationship between the concentration values obtained for priority substances to underlying the water quality assessment. The data presented in this paper are part of a national project carried out by the researchers from INCDPM (*www.incdpm.ro*).

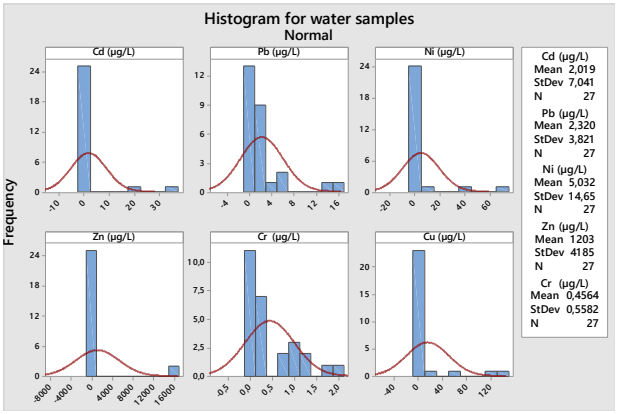


**Figure 1:** The distribution of the concentration values detected in the *water samples* by dividing the entire range of values into a series of intervals (columns)

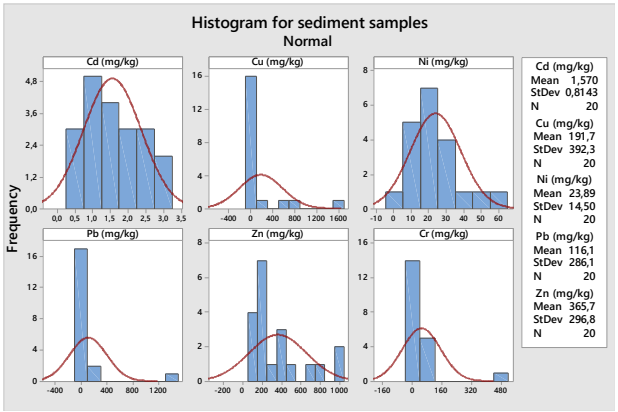


**Figure 2:** The distribution of the concentration values detected in the *sediment samples* by dividing the entire range of values into a series of intervals (columns)

*Keywords*: priority substances; Water Framework Directive; Danube River Basin waters

# WHAT WE KNOW AND DON'T KNOW ABOUT THE SOCIETAL AND ECONOMIC IMPACT OF SEVERE WEATHER EVENTS IN EUROPE

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## ABSTRACT

Each year, severe convective storms—those producing large hail, flash floods, severe wind gusts, tornadoes, and cloud-to-ground lightning—are associated with hundreds of injuries and fatalities and damages estimated at tens of millions of euros in Europe. Although a relatively large number of studies have analysed the spatial and temporal distribution of severe weather events in Europe, very few studies have focused on the societal and economic of these events. First, we present an overview of recent studies analysing the impact of severe convective storms in Europe, with an emphasize on those analysing the impact of tornadoes and cloud-to-ground lightning. Thus, using a pan-European severe weather dataset (i.e., the European Severe Weather Database developed and maintained by the European Severe Storms Laboratory) we will show that the threat of tornadoes is currently underestimated in Europe.

Second, to understand the current and future impact of severe convective storms, we construct a series of "worst case scenarios" based on the strongest tornado outbreak in the recent history of Europe (i.e., the 24-25 June 1967 tornado outbreak over France, Belgium, and the Netherlands). Thus, we will show that the impact of tornadoes, and by extension of severe convective storms, will increase due to the potential increase in exposure (i.e., population increase, city growth) and risk (i.e., increase in the frequency of environments associated with severe convective storms due to the climate change).

Third, we will show that currently, we do not have a clear picture of the impact (i.e., fatalities) of cloud-to-ground lightning from a pan-European perspective. Using a dataset developed by the National Institute for Statistics, we will show that the lightning fatality rate (i.e., number of fatalities per million inhabitants) in Romania is one of the highest in Europe, despite the decrease in the fatality rate in the recent years.

These results show that we need to 1) increase the awareness of severe convective storms in Europe (in particular, on tornadoes), 2) develop disaster management policies that will include all types of severe weather events, and 3) develop mitigation activities and information campaigns about the risks associated severe weather events in Europe.

*Keywords*: severe weather, tornadoes, lightning, societal and economic impact, risk, disaster management.

# RELATIONSHIP BETWEEN PEAK GROUND ACCELERATION AND MACROSEISMIC INTENSITY FOR STRONG INTERMEDIATE-DEPTH EARTHQUAKES OF VRANCEA REGION

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## ABSTRACT

The Vrancea intermediate-depth seismogenic zone, located at the bend of the Southeastern Carpathians, is one of the most active intracontinental seismic areas in Europe; it generates 1-to-5 events with moment magnitude greater than 7 each century, according to the existing historical earthquake catalogues.
During the second half of the XXth century, 4 earthquakes with moment magnitude greater than 6 occurred in the region: the events of March 4, 1977 (Mw 7.4), August 30, 1986 (Mw 7.1), May 30, 1990 (Mw 6.9), and May 31, 1990 (Mw 6.4). The macroseismic intensity maps of these events provide the most detailed descriptions of the variations of shaking and damage available for Vrancea earthquakes.
On the other hand, the poor seismic instrumentation in the region resulted in a rather modest number of strong motion records of these earthquakes; all strong motion data are analogue, and collected from sites located in the Extra-Carpathian area.
The strongest digitally recorded undercrustal earthquake of Vrancea is the Mw 6.0 event of October 27, 2004. This is the largest seism which occurred in the study area, after the events of 1990.
For each of the significant earthquakes listed above we correlated the peak horizontal accelerations to the observed intensity values The regressions were made on the geometric mean of the acceleration values for a given intensity unit. Using the data from all five events, we developed a regression relationship between macroseismic intensity in MSK scale and horizontal peak ground acceleration (PGA), for intensity in the range $V \leq I \leq VIII$. For this range – where the intensities are defined by the level of damage – a simple power-law representation is adequate and convenient.
The determined relationship allows a rapid evaluation – from instrumental real time data – of the extent of potential damages following a significant Vrancea earthquake, and may be used for emergency response and loss estimation.

*Keywords*: Vrancea seismic region, intermediate-depth earthquakes, peak ground acceleration (PGA), MSK macroseismic intensity, regression analysis

# ANALYZING DIFFERENT INTERPOLATION METHOD FOR CREATING 3D BATHYMETRIC MODELS. CASE STUDY: SIRET RIVER

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## ABSTRACT

Research shows that in recent years, testing and comparing of various interpolation methods is based on the development of numerical representation models applied in natural landscapes (meandering river) with different morphometric and morphologies and a large range of scales. Thus, using a geographical information system (GIS), the density of measured point data improves the topographic representation in 3D of river main channel. The purpose of this paper is to settle the main important and accurate interpolation method that can be applied in creating bathymetric maps. Using precision bathymetric maps, we can also extract depth data and use it in other bathymetric projects, like hydraulic or hydrodynamic modeling.

To achieve the main purpose of this research, it was used a combined efficient method of bathymetric measurements, using a single beam echo sounder combined with RTK GPS technique. The present bathymetric survey was developed on the lower course of Siret River. The study aims to present the analyses of different interpolation methods for determining the missing values during the measurement. Furthermore, the analysis revealed, that depending on used interpolation method, it can be created a coherent river terrain model, which can be used for other purposes, like 1D/2D or 3D hydrodynamic modeling and flood inundation mapping.

*Keywords*: interpolation, bathymetry, single beam echo sounder, flood, Siret River

# CALIBRATION OF CHANNEL ROUGHNESS FOR FLOOD MAPPING ON LOWER SIRET RIVER USING HEC-RAS MODEL

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## ABSTRACT

At present, the value of channel roughness represents the most important parameter of hydraulic model calibration for flood mapping and flood forecasting. In practice, the roughness coefficient (Manning's "n" value) cannot be determined from in situ surveying, but it can be automatically extracted from alternative sources, like pedological maps, ortophotoplans by digitizing each polygon associated with "n" value or using satellite images LANDSAT. For calibration of Manning's "n" values, it was used the data from 2005, when a major flood occurred in this study area. To verify the performance of calibrated HEC-RAS model, it was analyzed the flood peaks of observed and simulated values, and computation of root mean square error for the used hydrograph station on the lower Siret River. The study aims to present an efficient calibration method for flood mapping using HEC-RAS model.

*Keywords*: roughness coefficient, Manning's value, HEC-RAS, flood, Siret River

# INTEGRATED BIOREFINERY TECHNOLOGIES USED FOR AGRICULTURAL RESIDUES RESULTED FROM CEREAL PRODUCTION

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## ABSTRACT

Based on EuroStat data the harvested cereals in EU-28 was around 301 Million tonnes in 2016, of which the Romanian agricultural sector produced 21.7 Million tonnes. This results also in the production of substantial amounts of biomass, namely residues and by- products such as straws and corn stover, which are left in the fields due to the lack of noteworthy technological applications. This management practice has potential advantages on the agricultural side, decreasing the need for mulching and fertilizers. But it also has several negative aspects, specifically, one of the most significant is the environmental pollution problem derived by the natural degradation of these organic wastes that induces the production of Carbon dioxide (CO2), Nitrous oxide (N2O) and methane (all relevant green-house gases) that are introduced in the atmosphere. As such, the recollection and processing of these agricultural wastes and residues can have environmental benefits and will yield a large amount of potential biorefinery raw materials.
The present paper is focused on the creation of a database with potential existing feedstocks on the Romanian agricultural sector that can be used for biorefinery technologies and to present several potential technological schemes for the production of the second generation biofuels and different add-value products useable in the food, pharmaceutical, chemical and cosmetics industries. Experimental data regarding feedstock characterization from the point of view of the requirements of the biorefinery process together with data related to the production of fermentable sugars from the residues of the most relevant cultivated cereals in Romania (corn cobs and the wheat straw) will be presented. This is the basis for material balance evaluation of the technologies and its preliminary environmental and economic assessment

*Keywords*: biomass, biorefinery, cereals, agricultural residues

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# INDUST: INTERNATIONAL NETWORK TO ENCOURAGE THE USE OF MONITORING AND FORECASTING DUST PRODUCTS

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## ABSTRACT

Sand and Dust Storms (SDS) are extreme meteorological phenomena that generate significant amounts of airborne mineral dust particles. SDS play a significant role in different aspects of weather, climate and atmospheric chemistry and represent a serious hazard for life, health, property, environment and economy. Understanding, managing and mitigating SDS risks and effects requires fundamental and cross-disciplinary knowledge.

Over the last few years, numerical prediction and observational products from ground- and satellite platforms have become prominent at several research and operational weather centres due to growing interest from diverse stakeholders, such as solar energy plant managers, health professionals, aviation and policy makers. Current attempts to transfer tailored products to end-users are not coordinated, and the same technological and social obstacles are tackled individually by all different groups, a process that makes the use of data slow and expensive.

The EU-funded COST Action InDust has an overall objective to establish a network involving research institutions, service providers and potential end users of information on airborne dust. Because, airborne dust transport has multi- and trans-disciplinary effects at local, regional and global scales; InDust involves a multidisciplinary group of international experts on aerosol measurements, regional aerosol modelling, stakeholders and social scientists. Moreover, InDust searches to coordinate and harmonise the process of transferring dust observation and prediction data to users as well as to assist the diverse socio-economic sectors affected by the presence of high concentrations of airborne mineral dust.

Cooperation with institutions from near-neighbouring and international partner countries in Northern Africa and the Middle East will be essential and of mutual benefit, because dust concentrations are much higher and the adverse effects more severe near the sources than far downwind. Moreover, the participation of

South African, American and importantly Asian partners brings the possibility of extending the application of the developed products, protocols and tools well beyond the European borders, including areas like Asian regions where dust particles play a significant role in the air quality and meteorological processes.

# QUALITY AND RISK ASSESMENT OF NADAS RIVER

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## ABSTRACT

The quality of the water is directly influenced by the human activities within the catchment (domestic, agricultural and industrial activities) through the hole river basin and represents a critical issue in many countries.
The aim of this study was to evaluate the quality of the Nadas River, the river that drains into the Someșul Mic River in Cluj-Napoca. Consequently, several parameters such as pH, conductivity, TDS, heavy metals, biochemical oxygen demand, anions, detergents, complexes cyanide were taken into consideration and analysed.
The pH values were quite constant (from 7.9 to 8.2) and conductivity values varied in the range 1160 µS/cm and 1702 µS/cm. The trace metal values were within the permissible, with slightly differences from one point of sampling to another. The detergent concentration was in the range of 0.05-0.15 mg/L.
Also, the water quality was evaluated using the water quality index (WQI) method taken into account the values obtained for pH, conductivity, TDS, anions. The WQI indicated values between 13.3 and 1034.
The obtained results show that the anions overcome the recommended level of concentration mention in the Romanian legislation, confirmed by WQI.

# STUDY ON THE UTILISATION OF THE WASTE DERIVED FROM THE BAKER'S YEAST INDUSTRY USED AS FERTILISER, WITH REGARD TO THE EGG PLANT AND BELL PEPPER QUALITY AND YIELD

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## ABSTRACT

The waste derived from the baker's yeast industry has got a tremendous potential for improving the quality of the soil, thanks to a rich content of nutrients, such as N, P and K. The present study aims at setting out the effects of the soil quality improvement by the addition of the bio-fertilisers represented by the waste ensued from the baker's yeast industry (molasses distillation remains and purging sludge) upon the yield of bell pepper (*Capsicum annuum* L.) and egg plants (*Solanum melongena* L.) and also upon the quality of the resulted fruits.

The experiments were carried out with the help of the waste derived from the baker's yeast industry, on the garden soil from two different locations in the Bistriţa-Năsăud county, on the plant yield and on the quality of the egg plant and bell pepper fruits. The variants under experiment consisted in treating the egg plants (*Solanum melongena* L.) and the bell peppers (*Capsicum annuum* L.) by waste derived from the baker's yeast industry (molasses distillation remains and purging sludge), both separately, in various concentrations, and in combination, with an aim to obtain a complex fertiliser.

The preliminary experiments showed that these two products had got the potential of being used as a source of mineral and organic fertilisation of the soil.

*Keywords* : waste derived from the baker's yeast industry, bio-fertilisers, nutrients - N, P, K, egg plants, bell peppers, vegetable yield and quality.

# ON THE VOLCANIC HAZARD IN ROMANIA. GEOPHYSICAL INSIGHTS INTO THE CIOMADUL VOLCANO

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## ABSTRACT

During the last years, there have been several papers bringing into discussion the volcanic hazard on the Romanian territory. With less than 0.03 Ma since its last eruption, the Ciomadul volcano, located in the south-easternmost edge of the Neogene to Quaternary volcanic range of East Carpathians, seems to qualify for a dormant volcano according to the latest definitions of the volcanism unrest.
The low velocity anomaly and geo-electrical high conductivity zone, much deeper located beneath the volcano were interpreted by some authors in terms of a magma reservoir that could be reactivated in favourable tectonic circumstances. The area has been relatively recent subject to some geophysical investigations. Local gravity and geomagnetic surveys have been conducted in the attempt to reveal geological structures hidden beneath the volcanism outputs. The paper presents some conclusions of the interpretation of their main results.
Overall, the patterns of the geomagnetic and gravity fields are in agreement with the previous model of volcano based on geological evidence. However, the 3D inversion of the gravity and geomagnetic data under constraint of the rock physics properties unveiled new underground peculiarities. The largely developed mass deficit and lack of magnetisation outlined below most of the volcano edifice could not be attributed to the presence of a melt zone because no temperature increase may justify the low density values revealed by inversion. Besides, the eventual presence of molten rocks in the shallow crust (the top of the density anomaly is at about 2km bellow lake Sfanta Ana and Mohos peat-bog) should consequently generate high geothermal manifestations at the surface (e.g. geysers), which is not the case.
It is more likely that the density decrease in the volcanic rocks and loss of magnetic properties in low density zones are due to a hydrothermal alteration process. The eventual presence of argillite minerals may fully justify low density values and lack of magnetisation revealed by the numerical models.
Overall, central domes of volcano appear to line up along a major fault split towards the surface into several branches. It crosses NNE-SSW the area, consistently with the strike of the well-known East Carpathians Alpine overthrust lines, and seemed to serve as the main way along which magma reached the surface. During the post-volcanism stage, the same fault allowed the hot fluids coming from the deeper sited magma chamber to develop a hydrothermal transform system beneath the volcano.
The largest decrease in rock density has been noticed on the eastern side of the volcano (e.g. Balvanyos and Puciosul domes) where the assumed hydrothermal alteration is supported by geological evidence.
Acknowledgement. The needed time-consuming computations benefitted the HPC infrastructure created within EU funded CYBERDYN project through the grant POS CCE O 2.1.2. ID 593 (contract 184/2010).

*Keywords*: volcanic hazard, gravity, geomagnetism, numerical modelling, hydrothermal alteration, Ciomadul volcano

# THE EVOLUTION OF NO2 AND SO2 EMISSIONS FOR SOME LARGE POWER PLANTS LOCATED IN ROMANIA AND EUROPE

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## ABSTRACT

This paper analyzes the evolution of NO2 and SO2 emissions in the case of several large power plants located in Romania and Europe before and after the implementation of EU directives. The study uses data provided by space instruments (OMI – Ozone Monitoring Instrument), in-situ measurements and estimated emissions. We noticed good correlations between data sets from different measuring tools and also between NO2 and SO2 values obtained from OMI. The correlations may indicate that the satellite observations could be used as a successful method to check the air quality.

*Keywords*: atmosphere, nitrogen dioxide, sulfur dioxide, emissions, in-situ measurements, space observations

# AOD TO PM2.5 CONVERSION ALGORITHM USING WRF-CHEM AND SATELLITE DATA

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## ABSTRACT

High fine particulate matter (PM2.5) levels in air are a concern for people's health due to short-term effects such as eye, nose, throat and lung irritation, coughing, sneezing, runny nose and shortness of breath. Also, long term exposure may be associated with increased rates of chronic bronchitis, reduced lung function and increased mortality from lung cancer and heart disease. In recent decades, aerosols have received much attention by scientists, but the atmospheric processes and their interplay are very complex and can be assessed only with the combination of a multi-instrumental and multi-spatial approach. Remote sensing from satellites can provide a complimentary approach to in situ measurements of particulate matter but on a much larger scale with minimal investment, this can improve air quality control over large areas.
The goal of this study is to develop and implement a method to derive (PM2.5) concentrations by using satellite remote sensing data along with forecasted model aerosol data.
First, for the retrieval of aerosol optical depth (AOD) from satellite data a new approach was used to estimate surface reflectance based on the optimal interpolation technique. In the next step the WRF-Chem- Weather Research and Forecasting (WRF) model coupled with Chemistry is used to simulate the emission, transport, mixing, and chemical transformation of trace gases and aerosols simultaneously with the meteorology. The model outputs used further in the conversion algorithm are the aerosol species inorganic ions (NH4+, NO3−, SO4=), elemental carbon (EC), organic matter (OM, primary and SOA), aerosol water and mineral dust. WRF-Chem aerosol species have been grouped to reconstruct the aerosol components defined in GADS (Global Aerosol Data Set) for which the microphysical parameters are available. The T-matrix calculations needed to obtain the optical properties of a mixture of aerosols have been pre-computed for a large number of combinations of the aerosol's components and a look-up table has been generated, allowing us to obtain near real-time approximations of PM2.5 over large areas. This method provides the PM2.5 concentrations in the column and a conversion to obtain ground level PM2.5 will be necessary.
For testing the algorithm, in this study four regions were selected above Norway, Poland, Romania and the Czech Republic for the period of September 2014. The WRF-Chem model was ran for this month over the 4 domains and by using pre-validated AOD data from SEVIRI-Spinning Enhanced Visible and Infrared Imager, onboard geostationary MSG satellite platform. The PM2.5 concentration maps were computed using the developed algorithm. For the validation of the results in situ measurements were used.
Future developments will include an application that can run in real-time to provide PM2.5 data using pre-screened AOD maps from satellite and WRF-Chem maps of aerosols mixing ratios.

*Key words*: PM2.5, AOD, satellite, WRF-Chem

# THE EFFECT OF COMPOST ON SOIL PARAMETERS IN WINE-GROWING PLANTATION. CASE STUDY - RESEARCH STATION FOR VITICULTURE AND ENOLOGY BLAJ, ROMANIA

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## ABSTRACT

Soil, as a material and biological support, represents a living environment that can be irreversibly altered by human activities. Modern viticulture close to the ecological model ensures maximizing the quantity and quality of production and the company profit by minimizing the costs in the conditions of habitat preservation by eliminating disturbing factors. Fertilizer is one of the contributions to improve the viticulture productivity. Organic fertilizer are used in viticulture to increase organic matter and improve soil fertility. The compost, a stable humus-like product, rich in carbon content, obtain by biological decomposition and stabilization of organic residues is usable as a soil amendment and soil fertility.
The aim of this study was to evaluate the effects of the application of compost from grape marc on some soil quality indicators (pH, humus, N, P and K content) in wine-growing plantation of Research Station for Viticulture and Enology - Blaj. The obtained results indicate that the aplication of grape marc compost on soil increase the content of total N, P and K in soil. The pH value of soil remains constant after the aplication of compost.

# CLOUD COMPUTING AND DATA ANALYTICS IN WASTEWATER TREATMENT

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## ABSTRACT

Latest technological developments in the field of cloud computing lead towards developments of disruptive solutions in all society fields by providing better resources management and application flexibility while decreasing costs and increasing efficiency for integrators and final consumers. This paperwork presents a remote-control solution focused on the usage of cloud computing and data analytics advantages in the wastewater treatment (WWT) industry. First part of this paper presents a brief description of the paperwork while the reader is introduced to the main concepts on which the proposed solution relays. A state of the art regarding applications of cloud computing in waste water treatment is presented in the second part together with an overview of commercially available solutions. In the third part the proposed remote-control solution and its architecture is detailed. The use-case considers connecting the control unit of a WWT station module to a cloud computing platform. Data is analyzed using cloud computing functionalities and visualized in a web-page fashion. WWT station modules resources are controlled by algorithms developed and running on the cloud computing platform. At the end of the paper conclusions and lessons learned from the use-case are presented.

*Keywords*: wastewater, remote control, cloud, Internet of Things

# MULTI-SOURCE REMOTE SENSING DATA FUSION FOR URBAN LAND USE AND COVER CLASSIFICATION

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## ABSTRACT

Viewed as one of the causes of the global environmental change, the anthropogenic land use and land cover change accelerated in the last decades, reason why this fast-evolving and complex process deepen its environmental impact and increased the population demands. Quantifying the properties of land and overcoming the limitations of mapping the intricacies of land uses and cover, complementary remote sensing data can be used for obtaining detailed structural information. The major aim of the research is focused on classifying the urban area from the perspective of land use and land cover. This implies several different types of data sets and methodologies which through their fusion an improved accuracy is obtained. Secondly, for the purpose of comparing the performance of multi-source remote sensing data and the sensors potential for urban land use and land cover classification, the database is consisted of lidar point cloud data, very high resolution RGB imagery, multispectral data, ancillary data. The final results of the classification and data integration is assessed by taking into consideration the confusion matrix and the accuracy parameters. The study importance resides in the fact that the city can be seen as a living organism which has to take part to a continuous process of monitoring, its morphological characteristics and their changes being mandatory for implementing and maintaining a sustainable land management.

*Keywords:* lidar, multispectral data, confusion matrix, land management

# THE ORGANIC CARBON STOCK QUANTIFICATION USING SENTINEL-2 SATELLITE IMAGES IN NEAMTU RIVER BASIN

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## ABSTRACT

One of the most important properties of soil is soil organic carbon due to its contribution to the plants growing and environment management. Research in this field requires inexpensive, good quality and time efficient acquisition of soil data. The use of high resolution sensors, particularly Sentinel-2, has been identified as a potential means of reducing the limitations of classical procedures and accurately enhancing the soil databases at large scales. Each space-borne sensor has its strengths and weaknesses regarding the spatio-temporal and spectral features in digital soil mapping, reason why Sentinel-2 is considered to be a reliable remotely sensed data source for quantifying the soil organic carbon stock (SOC). Thus, optical remote sensing data offer soil extractable information, remote-located areas mapping, multi-temporal analysis, synoptic approach and cost-effective results. The present study assesses the SOC by integrating terrain data, classical data (laboratory analysed soil samples) and satellite data sets. The research was conducted in Neamtu river basin located in the northern part of Neamt County, cover a total area of 418 sq.km. The soil samples are characterized by several main information: parental material, land use, land cover, physical and chemical properties. SOC content of the samples was determined based on total organic carbon which was analyzed with Analytik Jena multi N/C 2100 with HT 1300 solid module. The spectral bands and the derived indices were determined as environmental variables being used as predictors in the present study. The findings highlight the potential of field and remote sensing data for quantifying the SOC stock at detailed scale. The advantage of satellite data usage can lead to optimized soil processing workflow, the data fusion providing more accurate results than non-integrated approaches.

# A PROPOSED STANDARDIZED PROTOCOL FOR RADON MEASUREMENTS IN PUBLIC BUILDINGS FROM ROMANIA (SCHOOLS, KINDERGARDENS AND OTHER LARGE BUILDINGS FOR WORKPLACES)

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## ABSTRACT

High indoor radon level represents a risk to the health of those who live and work in these spaces. Increasing exposure to radon enhances this risk proportionally with indoor radon concentration and exposure time. Since the exposure time cannot always be limited, mainly when it comes to housing, occupational environment, kindergarten or school, the key to radon exposure control is the measurement of radon in these spaces. When high levels of radon are found, mitigation measures for radon concentration are required. As a result, exposure to radon will also be reduced.

Exposure to radon is therefore a public health problem that caused development while a series of legislative measures in European Union, the most recent being Council Directive 2013/59/Euratom which will be applied in Romania starting with the second part of 2018. This Directive stipulates the mandatory establishing limits of radon, thus drawing attention to public health risks with respect to exposure to residential radon. The Directive requires implementation by each Member State of a long-term action plan for the establishment of radon exposure levels and the associated risks in dwellings, public buildings and workplaces.

The mandatory requirements related to the implementation of Council Directive 2013/59/Euratom in Romania triggered the need to develop a protocol for radon measurement in public buildings. Starting from the Protocol for radon measurements in schools and kindergartens established by the Norwegian Radiation Protection Authority (NRPA) and taking into account the radon concentrations specific for Romanian territory (radon map) as well as other peculiarities related to the targeted public buildings, a specific methodology has been developed for Romania and will be proposed to the national authorities as *a standard protocol for public buildings*, in order to performed the radon measurements in different types of public buildings.

# CLOUD COMPUTING AND DATA ANALYTICS IN WASTEWATER TREATMENT

S. BRAD, M. MURAR, G. VLAD, M. SLAVOACA

## ABSTRACT

Latest technological developments in the field of cloud computing lead towards developments of disruptive solutions in all society fields by providing better resources management and application flexibility while decreasing costs and increasing efficiency for integrators and final consumers. This paperwork presents a remote-control solution focused on the usage of cloud computing and data analytics advantages in the wastewater treatment (WWT) industry. First part of this paper presents a brief description of the paperwork while the reader is introduced to the main concepts on which the proposed solution relays. A state of the art regarding applications of cloud computing in waste water treatment is presented in the second part together with an overview of commercially available solutions. In the third part the proposed remote-control solution and its architecture is detailed. The use-case considers connecting the control unit of a WWT station module to a cloud computing platform. Data is analyzed using cloud computing functionalities and visualized in a web-page fashion. WWT station modules resources are controlled by algorithms developed and running on the cloud computing platform. At the end of the paper conclusions and lessons learned from the use-case are presented.

*Keywords*: wastewater, remote control, cloud, Internet of Things

# MUREȘ MEADOW NATURAL PARK AND LOCAL COMMUNITIES: A COMMON FIGHT AGAINST INVASIVE SPECIES

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## ABSTRACT

Invasive plant species, like Amorpha fruticosa L., Acer negundo, Fallopia Japonica, endanger the conservation status of ecosystems in the Mureș Meadow Natural Park. The research that was performed in order to rehabilitate the affected agro-ecosystems was accompanied by an awareness campaign in order to arise the local population knowledge regarding the danger of continuous extending of invasive species and the unsustainable agricultural practices. The research was done during the awareness campaign to evaluate the attitude of local communities towards invasive species and to evaluate the efficiency of awareness campaign. As a result of awareness-raising activities, local authorities believe overwhelmingly that meetings with the Administration of the Mureș Meadow Natural Park are timely and that measures to combat invasive species are welcomed and given great importance. The interest and the openness of the locals to such meetings and the particular interest in the information received were manifested.

*Keywords*: natural park, invasive species, awarness, local communities

# ADVANCED OXIDATION PROCESS DEGRADATION OF DYE USING CARBON NANOTUBES

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## ABSTRACT

Population growth and new products brought on the market have led to increased amounts of pollutants in wastewater and increase the persistent organic pollutants, including colourants that are released daily in the wastewater and accumulate in the aquatic environment. Advanced oxidation technologies have received increased attention to solving water pollution problems, being described as powerful and promising methods for effectively eliminating persistent organic pollutants in wastewater. In this paper, electro-Fenton degradation of dye (Carbon Derma AF) has been studied using carbon nanotubes in different concentrations. Carbon nanotubes were prepared by precipitation of Fe over the carbon nanotubes at basic pH. Using a carbon fibre material for the cathode electrode and a boron-doped diamond (BDD) for the anode, in a cylindrical glass reactor, at different intensities and pH, it was performed the decolourization of polluted water with dye (Carbon Derma AF). The effect of nanoparticles on dye and the iron concentration released by carbon nanotubes were monitored and measured spectrophotometrically. The measurements confirm that the decolourization time increases when the concentration of the nanoparticles is lower because the catalyst concentration in the system decreases. The reuse of nanotubes in the electro-Fenton system is an advantage for the cost of wastewater treatment because the catalyst material can be used in a continuous system.

*Keywords*: Electro-Fenton, Carbon nanotubes, Carbon fibre, Dye, Water pollution, Degradation, Decolourization

# FOREST CERTIFICATION IN THE CONTEXT OF HIGHLY REGULATORY LEGAL FRAMEWORKS: THE CASE OF ROMANIA

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## ABSTRACT

Forest certification is a voluntary tool used as a market instrument to provide a guarantee to the consumers. In Romania, only the Forest Stewardship Council (FSC®) certification has been applied and currently 26 certificates for forest management are in place covering 2.68 million hectares of forest.
The management of forests in Romania is based on a highly regulatory framework – called forestry regime- routed in the traditional forestry system implemented in the context of socialist countries. Despite the existence of such a strict legal framework, governmental reports have proven important illegalities occurring at different levels of forest practices.
The aim is to identify, to which extends the application of FSC® certification in Romania, has resulted in the identification of gaps in the application of the legal framework. To do this, we have analysed the public reports.
The results of the analysis show that in the period of 2011-2017 a total number of 748 non-conformities and observations has been recorded by the auditors. By comparing the non-conformities with the existing regulations, 57,69% of the non-conformities identified represented a violation of the national legislation.
The failure to comply with current legislation puts pressure on the first principle of FSC® certification, which refers to the fact that forest management should comply with national law. If for one certificate repeated acts that violates the legislation are identified, then the capacity of the company to respect the legal requirements is first to be questioned. At the same time, the capacity of the legal system to be implemented efficiently is questionable, as even the companies that express the willingness to adhere to a voluntary system have important problems to first comply with the existing legal system.

# SOIL-VEGETATION RELATIONSHIP AS TIME FUNCTION IN THE PROCESS OF SOIL FORMATION AND RESTORATION OF BIODIVERSITY ON THE SURFACE OF TAILINGS DUMPS IN THE LIMESTONE QUARRY OF THE JOINT-STOCK LAFARGE CEMENT PLANT (MOLDOVA). CASE STUDY

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## ABSTRACT

The morphological description of the newly formed soil profiles on the tailings dumps located in the limestone quarry are presented in the paper. The type of newly formed soil profiles represents regosols with varying degrees of evolution depending on the actual daytime exposure period or the age of the tailings dumps. The highest degree of evolution of the solidification process is represented by the regosol on the surface of the 25-year-old tailings. The results obtained prove the fact that the process of restoration of biodiversity on the surface of the tailings dumps is due to the surface earth material, formed by earthworks, consisting of layers of clays and fossil soils of the age of the Pleistocene Inferior. This earth material, serving as a biotope, ensures the initiation of the biodiversity process and the formation of the primary humus accumulation horizon, a precursor of horizon A.

Depending on the time of the tailings exposure to the process of solidification, the content of the organic matter in the newly formed soil increases, the soil aggregate structure improves, the profile thickness increases, the biomass increases and the vegetation is richer in species.

The results regarding the content of heavy metals on the surface of the tailings dumps indicate that in both layers of soil (0-20 and 20-40 cm) and the fresh dumps (0 years) the heavy metals content is higher than in the dumps of 25, 20, 10, and 5 years-old, which is probably explained by the export of these metals by the plant species that grow on the surface of the tailings dumps.

The largest amount of Kjeldahl phosphorus P mg / kg is found in the regosol layer located on the surface of the 25-year tailings dump and is probably due to the fact that on this dump the largest organic mass is generated and accumulated out of the plant species growing on this dump.

Thus, it is established that the formation of soil on the surface of tailings dumps and the restoration of biodiversity is an interdependent process.

*Keywords*: tailings dumps, newly formed soil, vegetation, restoration of biodiversity.

# THE CURRENT STATE OF THE SOIL COVER IN THE RAUT RIVER CATCHMENT BASIN FROM THE CENTRE DEVELOPMENT REGION. CASE STUDY.

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## ABSTRACT

Alluvial intra-zonal hydromorphic types and subtypes represent the soil cover in the researched area of the Răut River basin. In terms of pollution, these soils are considered unpolluted. The degradation of the soil cover in the researched area of the Raut meadow is conditioned by erosion and earthworks that led to the formation of a mosaic soil cover.

The natural conditions in combination with the anthropic ones determine the intensity and direction of the paedogenesis processes, the character and the degree of evolution of the soil cover degradation processes of the researched area. The diversity of relief conditions, rock, climate and hydrology condition the formation of a variable and complex soil cover on the studied territory.

The moderate and strong fragmentation of the Raut river basin relief, the complicated lithology of surface rocks and the anthropic activity have led to the development of erosion processes on the surface and in the depths on the slopes through the water, as well as to landslides. The unfavourable regime and chemistry of the groundwater on some sites in the Raut meadow led to the swamping, salinization and alkalization of the soils.

*Keywords*: soil cover, catchment basin, anthropic impact.

# RADON MEASUREMENTS TO ASSESS THE RADIATION SAFETY FOR UNDERGROUND WORKERS

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## ABSTRACT

The main hazard in terms of radiation safety is posed by the accumulation of radon. Radon levels can vary widely from one environment to the next but also in the same environment. It is a known fact that it can reach dangerous levels in underground environments such as mines, moffetts or caves. The radon concentrations and its distribution in caves is directly correlated with different internal and external factors such as temperature, wind velocity, atmospheric pressure and humidity, local geomorphology, etc. The development of a show cave requires, in addition to the conservation issues, an assessment of the radiological hazard to visitors and cave personnel. In the case of most show caves, ensuring an artificial ventilation system is not an option as any disturbance of the natural microclimate would rapidly compromise the cave assets. However the new EU-BSS recommendations state that the radon activity concentration in work places should not exceed 300 $Bqm^{-3}$. Since most of the underground workplaces present high levels of radioactivity it is of outmost importance to monitor radon levels on a regular basis in order to assess the risks for visitors and workers.

A long-term radon survey has been carried out for this purpose in 5 of the most popular Romanian show caves: Urşilor, Meziad, Polovragi, Valea Cetăţii and Muierilor. In three out of five investigated show caves radon concentrations measured higher levels than recommended for workplaces. Further analysis of occupational exposure to radon by personal dosimetry should be carried out for radiological protection purposes.

# EVOLUTION OF WALLOON AGRICULTURE TOWARDS AN ENVIRONMENT-FRIENDLY MODEL

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## ABSTRACT

Since the 1980's, the Common Agricultural Policy proposes voluntary measures in favour of the environment. These measures are continuously reinforced since then, some of them became compulsory if the farmers want to get direct payments, through the so-called "cross-compliance" after the 2003 reform and "green payment" after the 2013 reform. At the same time, organic farming received a legal status and was more and more supported and successful, like specific quality products, including origin-labelled products and products friendly to the environment. This paper examines and discusses: 1) the evolution of organic farming in Wallonia (South of Belgium) which represented 10% of the agricultural area and 11% of the number of farmers in 2016; 2) the implementation of the greening of the CAP in Wallonia from 2015 to 2017, with the choice between the different possible ecological focus areas, showing the success of catch crops or green cover; and 3) the increasing number of products officially recognized as "specific quality products". This evolution proves that the environment is more and more taken into account in the agricultural practices, leading to less environmental risks and a more efficient use of natural resources.

*Keywords*: Wallonia, environment, organic production, greening, specific quality products

# A CASE STUDY OF AEROSOL IMPACT ON PV PERFORMANCE IN ROMANIA

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## ABSTRACT

The last two decades have brought significant changes in the evolution of the renewable energy sector in Romania, especially solar energy sector. Atmosphere loaded with aerosol has a significant impact on photovoltaic (PV) panels' performance. Thus, atmospheric sensing is of great importance. Saharan dust transport to Europe and the biomass burning episodes are the main sources of aerosol in Romania. The study is based on aerosol data provided by Moderate Resolution Imaging Spectroradiometer (MODIS) and the optical aerosol properties are supplied by AERONET (Aerosol Robotic NETwork). Transelectrica website is used for collecting data regarding energy production from the photovoltaic system in Romania. Also, by running the HYSPLIT model, the source of aerosol origin is depicted. The conclusions focus on the influence of the energy losses when polluting episodes occur.
The research has support from the European Union Horizon 2020 research and innovation programme, under grant agreement No. 654109 and previously from the European Union Seventh Framework Programme (FP7/2007–2013), under grant agreement No 262254.

*Keywords*: aerosol, photovoltaic, renewable energy, energy transfer performance

# EXPERIMENTAL AND NUMERICAL STUDY OF INDOOR AIR QUALITY AND ENERGY CONSUMPTION OF A SINGLE-FAMILY DETACHED HOME

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## ABSTRACT

In this article the purpose is the assement of both energy efficiency and indoor air quality for a single-family detached house located in Cluj Napoca county, Romania. The studied house is meant to be an energy efficient building with thermal insulation, low U-value windows and high effiency boiler. However, when having a sealed house the indoor air quality is affected because there is no fresh air entering the occupied volume. The energy balance was calculated using both the actual Romanian methodology of certification and detailed numerical simulations using DesignBuilder Software. The energy consumption of the house were divided in three parts: heating, domestic hot water and illumination. The consumption was calculated to be for heating 73,8 kWh/m$^2$/year (class B), for domestic hot water 54,6 kWh/m$^2$/year (class C), for illumination 8,6 kWh/m$^2$/year (class B) with a total of 32678 kWh/year. Using a 3D model of the house the energy consumption and indoor comfort was evaluated using a simulation software. Similar results were obtained classifying this house as a medium to high energy efficient building. While simulations offered a detailed view on the energy consumptions of the building the indoor air quality was analyzed using a prototype equipement able to record data on radon, CO2, air temperature and humidity. The thermal comfort was found to be very good during occupation period with temperatures between 20$^o$C and 23$^o$C but low humidity (25% to 35%). The biggest problem found was in fact the radon concentrations that can reach even 2000 Bq/m$^3$ during certain periods of time. The measurements and the simulations proved that for this type of houses in this region the energy consumption is low, the thermal comfort is good but other indoor pollutants reach allarming values demanding urgent measures like installing a ventilation system to provide fresh and clean air from outside.

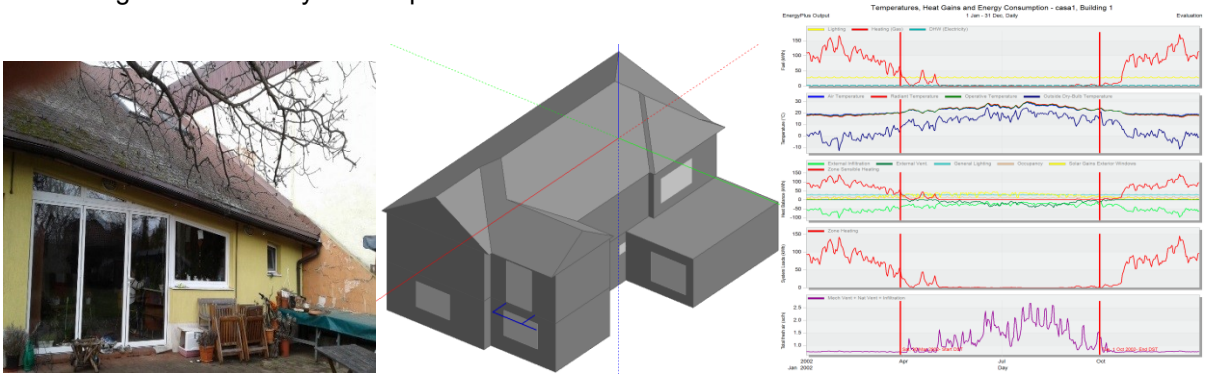


Figure 1. a) Photo of the house a) Building 3D Model in Design builder c) Simulation results

**Acknowledgement:** The research is supported by the project ID P_37_229, Contract No. 22/01.09.2016, with the title „***Smart Systems for Public Safety through Control and Mitigation of Residential Radon linked with Energy Efficiency Optimization of Buildings in Romanian Major Urban Agglomerations SMART-RAD-EN***" of the POC Programme.

# CLOSING THE LOOP: REDUCING THE CARBON FOOTPRINT OF CARDBOARD PACKAGING MANUFACTURING BY ECO-INNOVATION AND ECO-DESIGN

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## ABSTRACT

In this paper, the eco-innovation principles were applied in the framework of circular economy to valorize production waste in the form of eco-designed smart new products. This would allow to close the loop in the production process, extend production waste life cycle and diminish the carbon footprint.
In our study, we have selected a modern Romanian Manufacturer (RM) in the field of cardboard and corrugated board packaging, interested in knowledge transfer oriented toward the generation of economic benefits and environmental advantages. To accomplish our goal, we proposed a work-plan to close the production loop by reusing the production waste generated in the form of cardboard strips, edges and other production waste by innovating and designing new products, required by the marked in the area of packaging and buildings. This way the cardboard waste life cycle can be significantly extended in an eco-innovative strategy, put in practice based on eco-design principles.
The economic and environmental evaluation applied to one of the proposed new products manufactured from waste (Eco_P) and the associated process, involved Life Cycle Analysis, Cost-Benefit Analysis and Multi-Criteria Decision Analysis. Our evaluations reveal that, by revaluating the production waste and substituting the woody products with Eco_P, the carbon footprint will be reduced with an equivalent of almost 0.55 kg CO2/product item/year by saving over 2500 spruce trees.

*Keywords*: carbon footprint, greenhouse gas, life cycle, manufacturing, production waste

# ETHICAL ISSUES IN ECOLOGICAL RESTORATION OF STERILE DUMPS AND POTENTIAL OF PLANT SPECIES FOR PHYTOREMEDIATION: SEED GERMINATION OF ROBINIA PSEUDOACACIA IN VARIOUS AMENDMENTS WITH HEAVY METALS

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## ABSTRACT

The relationship of mankind with natural systems is very important in terms of sustainable development. In many places around the world, mining activities performed in the past have left significant amounts of sterile material improperly deposited, which is an important source of impact and risk on the quality of the environment and human health. Technology and science are available so that the incentive left to implement the green restoration is ethical responsibility in this respect. Sustainable development is given top priority as an environmental policy in most countries. It is obvious that it is very difficult to achieve sustainable development unless environmentally ethical approaches can be harmonized. It is therefore necessary to integrate ethical approaches into environmental policies. In order to find the most suitable plant able to remedy the current situation of abandoned sterile dumps, the Robinia Pseudoacacia species was subjected to the germination test in various prepared solutions. The results showed that seeds germinate and grow much better in an acidic medium than in a neutral medium and in the absence of carbonates. A 100% germination percentage resulted in the most acidic solution containing only tap water and sterile material. In the standard solution acacia seeds germinated with a rate of 55%, but in all other solutions that contained the CaCO3 no seeds were germinated.

*Keywords*: seeds germination test, heavy metals, *Robinia Pseudoacacia*, sterile dump; amendments

# RISKS ASSOCIATED WITH WASTE MANAGEMENT ACTIVITIES (I): THE NATURAL POST-DISASTER RECOVERY PHASE

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## ABSTRACT

The unity of the human society with the environment - as a fundamental law of life - requires habitat protection against pollution, rational exploitation of resources and, as far as possible, increasing them to meet the growing needs of humanity. These problems, together with others, not only related to the human factor, require a detailed knowledge of the structure and interactions in our environment. The social and economic activities of some human groups may be disturbed by the tragic effects of natural phenomena and technological processes that are out of control. In this way, destructive and brutal disruptions of a system, a predetermined situation, or an unanimously accepted dynamic equilibrium can occur.
Through this paper, we aim to show that in the case of natural disasters, as well as technological ones, there is a particular interest in implementing sustainable response policies and strategies for the community and the environment. An important aspect of the paper deals with the risks associated with the waste management activity in the post-disaster recovery phase - as the last step in trying to bring the community and the environment, if not totally, at least partially, to the situation before the disaster occurred.

*Keywords*: natural disasters, recovery phase, waste management, disease risks

# THERMAL TREATMENT AND ELECTRIC FIELD BASED APPROACHES FOR PAHS REMEDIATION FROM CONTAMINATED SOILS

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## ABSTRACT

At national level, as well as in the international context, the main pollutants related to contaminated soils are the organic contaminants. In this regard, an especially attention is focused on Polycyclic Aromatic Hydrocarbons (PAHs) being already evidenced important information about the potential for negative effects in humans. In Romania, according to the National Strategy on Contaminated Soil Management, the highest number for the contaminated sites is due to the oil extraction industry followed by waste management. The most effective management tool used at national level in order to solve this environmental issue is bioremediation. Even if it was already successfully used in remediation of soils contaminated with crude oil and petroleum products, this technique have some limitations (it is not suitable for all soils, the complete degradation of the contaminants from soils is difficult to be achieved and natural conditions as temperature are difficult to be controlled).
The present paper presents results achieved during a national research project which has tested different remediation approaches for the remediation of the contaminated soils with petroleum products, paying attention mainly on PAHs removal from soil. The thermal treatment through pyrolysis process as well as the electric field based treatment (known as electrochemical remediation or electrokinetic remediation) as a possible solution for soil remediation are illustrated. During the experimental research different kinds of parameters were monitored in order to assess the PAHs remediation degree linked to every single remediation method that was tested. In this way, pH, redox potential, ionic strength, soil characteristics, voltage gradient and zeta potential were monitored across the electrochemical treatment, and temperature and retention time for the thermal treatment.
The treatment efficiency that has been obtained was between 50% and 70% concerning the electrochemical solution and between 85% and 98% related to the thermal treatment, according to the experimental conditions. Results were assessed evaluating the overall treatment efficiency correlated with the parameters monitored during the scientific research.

*Keywords*: PAH, electrochemical remediation, pyrolysis, soil pollution, remediation degree

# SOUND POLLUTION, VIBRATIONS AND THEIR NEW MODELING POSSIBILITY IN THE DYNAMIC SYSTEM OF SOILS

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## ABSTRACT

The modern consumer society's most pressing problems (e.g., expanded cultivated areas, intensification of agricultural production process, unreasonable exploitation of forests, industrialization and excessive urbanization) - as the results of the Human (economy and society) - Environment Interaction (HEI) - are complex and often transcend spatial and temporal scales; they are all causes that cause the soil, implicitly the whole habitat, to no longer be able to fulfill, in part or in full, its fundamental functions, also do not fall cleanly within the boundaries of a single discipline or area of interest, because of the Social-Ecological Systems (SESs) dynamics.
Through this paper, we aim to show that in the case of soil pollution there is an significant aspect, often ignored, which denotes a particular impact on the complex soil system, its configuration and its functions. During the course of the paper, we discuss a series of issues related to the possibilities of modeling soil dynamics in response to vibration and sonic pollution via Environmental Information Systems and Environmental Informatics software.

*Keywords*: soil pollution, dynamic systems, vibration representation, Environmental Informatics

# ECONOMIC AND ENVIRONMENTAL COST ANALYSIS OF CORRUGATED PACKAGING ALTERNATIVES FOR CLOSING THE LOOP IN THE MANUFACTURING SECTOR

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## ABSTRACT

Due to the high-volume of production waste generated, sustainable waste management is steadily becoming a serious economic and environmental issue. In many countries, the humans, makes efforts in the direction of economic development on a sustainable pathway for improving well-being, but also to protect the environment and preserve its resources. Paper and cardboard manufacturing is one of the industrial sectors with a great significance, which is focused very seriously on the: (i) circular economy, (ii) closing the production loop, (iii) eco-innovation and eco-design principles, since it is able to valorize waste at a high degree. In this study, we developed an analysis of waste reuse efficiency in the form of an eco-product (Eco-P). By applying the Cost-Benefit Analysis for the re-evaluation and reprocessing of production waste resulted from corrugated board and packaging manufacturing we demonstrate the this industrial system is able to further close the production loop and increase process eco-efficiency. Two scenarios were developed and evaluated in terms of economic and environmental cost analysis: (I) recycle production waste as recovered paper in paper mills; (II) life cycle extending by reprocessing production waste into a product requested by market, Eco-P. The results showed that turning production waste into raw material for the product Eco-P improves significantly process eco-efficiency by closing the loop, reduces eco-costs and increases the benefit/cost ratio.

*Keywords*: benefits, costs, eco-efficiency, eco-product, production waste

# RAINFALL-RUNOFF AND HYDRAULIC MODELLING USED FOR NATECH RISK ASSESSMENT IN CASE OF AN EXTREME STORM EVENT AT VALEA ȘESEI TAILING POND, ROMANIA

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## ABSTRACT

The mining activity in Romania lead to an important number of tailing dams that need to be properly managed in order to avoid the risk of accidents. This is especially true in the context of climate change which will bring more extreme weather conditions and the number of natural hazards will increase. These natural hazards can affect the tailing dams causing technological accidents. When there are industrial sites in an area prone to natural disaster, a NaTech accident (NAtural hazard triggering TECHnological disasters) may occur. The events from the past have had major consequences, highlighting the importance of better regulation, monitoring and management of tailing dams.

In this study, the impact of an extreme storm event with a return period of 10 000 years (probability - 0.01) on the Valea Șesei Tailing Pond was analyzed. Valea Sesei tailing pond is situated in Apuseni Mountains being the biggest one in Romania and collecting the tailings resulted from Rosia Poieni Cu ore (the second largest copper exploitation in Europe). Therefore, in case of a dam failure the consequences could be disastrous, the release of the liquid mixture composed of debris flows and muddy water, could cause economic damages, loss of lives as well as pollution of the water and soil with heavy metals.

The hydrological and hydraulic modelling are powerful technique used in order to estimate the watershed's hydrological response to precipitation and the flood wave generated as a consequence of this precipitations. The proposed methodology is following several steps. For the rainfall-runoff simulation GIS tools and the HEC-HMS mode were used. First, based on the ArcGIS capabilities, a 5 m resolution DEM and a series maps (e.g. land use, soil texture) were obtained. Then, in order to obtain the parameters required by the HEC-HSM model (e.g. CN, $T_{lag}$), the ArcHydro tools and HECGeo-HMS ArcGIS extension were used. Finally, specified hyetograph, SCS (Soil Conservation Service) curve number loss, SCS unit hydrograph transformation method, Lag routing and storage-discharge methods were chosen using HEC-HMS model tools.

The results in case of *10,000 year* extreme storm event the peak outflow discharge was found to be 123.5 $m^3/s$, in the conditions where the spillway is designed to safety drain 166 $m^3/s$. In this situation the inflow discharge and the flood volume that will enter in reservoir during the flood event were estimated to be 264.5 $m^3/s$ and 2.718 $mil.m^3$, respectively. Using the obtained discharge value, the downstream extend of the flood and water depth were determined using the HEC-RAS hydraulic model and the impact was estimated.

Therefore, the aim of the study is to analyze the Natech risk for a better knowledge of the possible consequences related with this type of accidents. This knowledge is important in order to implement better protection and prevention measures for an efficient risk reduction and cost-benefit analysis. It is also useful for planning strategies and flood risk management.

*Keywords*: extreme events, Natech analysis, HEC models, GIS tolls, consequences.

# LESSONS LEARNED FROM THE EXPLOSION AND FIRE AT THE BUNCEFIELD OIL STORAGE DEPOT, HEMEL HEMPSTEAD, HERTFORDSHIRE ON 11 DECEMBER 2005

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## ABSTRACT

On 10 December 2005, Tank 912 at the Hertfordshire Oil Storage Limited (HOSL) part of the Buncefield oil storage depot was filling with petrol. During loading operations large quantities of petrol overflowed from top of the tank. A vapour cloud formed which ignited causing a massive explosion and a fire
That lasted five days.
As the following investigation found the accident was initiated by two independent safeguards immediate failures. The tank had two forms of level control: a gauge (ATG) that enabled the employees to monitor the filling operation; and an independent high-level switch (IHLS) which was meant to close down operations automatically if the tank was overfilled. The first gauge stuck and the IHLS was inoperable – there was therefore no means to alert the control room staff that the tank was filling to dangerous levels.
We present here the technical, managerial and organisational failures and conditions - from the industrial process safety point of view - which led to the accident.

*Keywords*: major-accident, industrial process safety

# FROM ENVIRONMENTAL ETHICS TO SUSTAINABLE DECISION-MAKING: ASSESSMENT OF POTENTIAL ECOLOGICAL RISK IN SOILS AROUND ABANDONED MINING AREAS-CASE STUDY "LARGA DE SUS MINE" (ROMANIA)

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## ABSTRACT

Heavy metal contamination of soils is a widespread environmental problem associated with mining operations and has drawn considerable study interest, due to its impact on ecological environment. The present study aimed at investigating the heavy metals concentrations in the soils around "Larga de Sus" abandoned mine (Zlatna town, Romania), evaluating the potential ecological risk of heavy metal pollution and highlighting ethical aspects related to risk assessment and sustainable ecological restoration. Thus, the concentrations of Pb, Cr and Ni in ten soil samples collected from study area were determined by atomic adsorption spectrometry. The results of the chemical analysis showed that the soil in the study area is highly polluted with heavy metals since the average concentrations of Pb (32.4-2318.1 mg/kg), and Ni (321.6-562.8 mg/kg) in soil exceed their corresponding threshold limits established by the Romanian legislation. The potential ecological risk index method developed by Hakanson was used to assess the potential risk of heavy-metal pollution. The potential ecological risk index results indicated that Pb and Ni showed severe and considerable potential ecological risk, while the other heavy metal (Cr) had lightly ecological risk. But how can we decide which or if risk is acceptable? or what is needed to make the right choice of the most appropriate alternative that fits our personality, culture, religion and desires? Through this study we try to highlight the importance of the ethical approaches in risk assessment and ecological restoration in order to make optimum sustainable decisions and to achieve a real environmental protection.

*Keywords*: environmental ethics; ecological risk assessment; heavy metals; soil pollution; sustainability.

# MEASUREMENTS OF TROPOSPHERIC NO2 USING IN-SITU AND MOBILE DOAS OBSERVATIONS

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## ABSTRACT

In this work we present the in-situ and mobile DOAS observations of NO2 using a car vehicle. The target trace gas is the nitrogen dioxide (NO2). NO2 is an important toxic atmospheric trace gas with a negative effect on the atmospheric chemistry, human health and environment. The study is focused over Bucharest city (44.43°N, 26.10°E), the main and largest city from Romania. The main source of pollution in Bucharest city is represented by the emissions from the road transports, local industry and some power plants. The DOAS instrument onboard the car vehicle is based on a compact UV-Vis spectrometer and a GPS connected to a portable PC. We present the map of NO2 pollution over Bucharest city using mobile DOAS obserations and in-situ measurements. Also, comparisons between the DOAS observations and in-situ measurements are presented.

*Keywords*: mobile DOAS, in-situ, nitrogen dioxide

# ECOSYSTEM SERVICES IN RIPARIAN AREAS: CURRENT STRUCTURE AND KNOWLEDGE NEEDS FOR BETTER DECISION MAKING

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## ABSTRACT

Riparian areas, defined as the adjacent freshwater ecosystem zone including the flood-plain, represent an important ecological feature that sustains a rich biodiversity and complexes of ecosystems that are providing useful ecosystem services to humans (e.g. food regulation, water purification, recreation). Current work is aimed at providing an overview about the distribution of ecosystem types belonging to Romania's major rivers riparian areas (up to order three following Hack's ordering). The current status is assessed against their potential role to provide a wide range of ecosystem services. High resolution data provided by EU program Copernicus were mapped and analyzed using GIS environment. The total coverage of riparian areas represent 13.5% of Romanian territory. Among the 73 types of ecosystems identified within the riparian areas (according MAES level 4 classification), the most dominant one is represented by "Non-irrigated arable land". The weight of natural, semi-natural, man-dominated, and man-created systems are as following: 35.9%, 0.1%, 47.1%, and 16.9%, respectively. These values are indicating a high degree of naturalness but also a very high pressures from socio-economic systems. The identified ecosystems where associated to their potential rank to provide various services, then the general categories of ecosystem services were mapped. Conflicts between policy and current state of the riparian areas were identified and knowledge needs are discussed. We are considering that such approach is useful for setting-up the baseline for current state of riparian areas in Romania and creating the ground for scientific sound decision making. Also, our results are a useful way to communicate the importance of riparian ecosystems for human wellbeing.

*Keywords*: riparian areas, land use land cover, ecosystem services, geographic information systems, policy making

# OVERCOMING CHALLENGES TO COHESIVE DISASTER RISK REDUCTION AND CLIMATE CHANGE ADAPTATION IN EUROPEAN LOCAL AUTHORITIES

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## ABSTRACT

There has been considerable discussion regarding the integration of disaster risk reduction (DRR) and climate change adaptation (CCA) and the benefits of doing so in achieving resilience aims and in furthering the post-2015 international development agenda. Despite this, in practice there is limited evidence of successful integration occurring on the ground.

The responsibility of implementing DRR and CCA action in Europe ordinarily lies with local authorities, however they often lack the capacity to manage all the principles, practices and policies bestowed upon them. In this study, the challenges to successful CCA and DRR integration at the local authority level are explored and examples of best practice and recommendations presented with the aim of highlighting ways forward in fostering a harmonised approach. The study draws upon findings from six national reports (Denmark, France, Germany, Italy, Switzerland and the UK) produced as part of the ESPREssO project (Enhancing Synergies for Disaster Prevention in the European Union), funded by the European Commission Horizon 2020 Programme. The aim of ESPREssO is to produce a new vision and guidelines on how to approach DRR and CCA, opening new frontiers for research and policy making.

Findings from the study show that lack of local capacity, competing priorities and lack of horizontal and vertical coordination of governance frequently present barriers to successful integration in the six European countries. To overcome these challenges several recommendations are presented including resource sharing, increased involvement of local levels in decision making, awareness building and engagement of the private sector, in order to further positive DRR-CCA action.

Improved coherence of CCA and DRR at the local level is important in creating positive action and achieving the goals of the Sendai Framework for Disaster Risk Reduction (SFDRR), the Paris Agreement and Sustainable Development Goals.

*Keywords*: climate change adaptation, disaster risk reduction, Europe.

# QUANTIFICATION OF MATERIAL DAMAGES GENERATED BY EARTHQUAKE – CASE STUDY: ROMANIA

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## ABSTRACT

The main purpose of this study is the quantification of material damages generated by an earthquake considering the case of Romania and its capital, Bucharest, the most exposed European Union capital to earthquake risk. Basically, we'll start from different scenarios of distribution of macro-systemic intensities on seismogenic zones, the structure of the housing stock on different buildings types, damage degree, areas exposed and unitary reconstruction values and using vulnerability functions and damage probability matrix we'll obtain a value that represents the impact of a future earthquake.
Our approach will also include the analysis of the mandatory home insurance policy and to what extent it represents a solution for managing the impact of a catastrophic risk considering its current design and coverage. In addition, other options for earthquake risk management will be addressed, like voluntary home insurance policy and alternative risk transfer solution (catastrophe bonds)

*Keywords*: earthquake risk, vulnerability functions, damage probability matrix, mandatory home insurance policy, voluntary home insurance policy, alternative risk transfer solution

# THE PAST AND THE FUTURE OF THE INDOOR RADON. WHERE ARE WE NOW?

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## ABSTRACT

The presentation aims to review how the recommendations for radon exposure reduction evolved since the first ICRP's recommendations, which focused on protection of uranium and other mines, in 1977, to the newest dose conversion coefficients published this year in ICRP Publication 137.
Attention is paid to the way that some European countries agreed to establish radon policies and to increase the awareness among the general population about the risk associated with radon, and to the fact that the gradual approach to the control of radon exposures in Romania should be based on both ambition and realism.

*Keywords*: radon exposure, radon awareness, radon graded approach

# SPACE-AND-TIME CHARACTERIZATION OF TRACE POLLUTANTS OVER IASI CITY. LASER INDUCED RAMAN & BREAKDOWN SPECTROSCOPY TECHNIQUES

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## ABSTRACT

We present here the research of some toxic trace chemical compounds over Iasi city in different complex atmosphere conditions, both for fundamental and applications. The self-cleaning of the atmosphere under humidity conditions have been analyzed, too. These measurements are based on the change in emission intensity when chemical traces are investigated with DARLIOES - the advanced LIDAR based on space-and-time-resolved RAMAN and breakdown spectroscopy. This active optical instrument is able to capture a fast plume airborne image (2 ns gate time) and can be used to investigate in real-time the behavior of several chemical compounds at a given point of the free atmosphere (up to 15 km in altitude), with a spatial resolution of up to 1 cm. The change in chemical composition of the atmosphere was assumed to different chemical reactions involving presence of the water, too. Water dissociation that was registered during spectral measurements has been explained by a simulation of the interaction between artificial light and snowflakes – virtually designed in a spherical geometry - in a wet air environment, using COMSOL Multiphysics software. Moreover, some turbulence behavior and the pollution-associated atmospheric parameters, based on both theoretical and experimental data (LIDAR) will be presented, too.

*Keywords*: LIDAR, air pollutants, space and time resolved Raman spectroscopy, atmosphere turbulence

# COMPARATIVE STUDY OF THE TEMPORAL DYNAMICS OF ATMOSPHERIC POLLUTION. STUDY CASE: GALATI CITY

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## ABSTRACT

Earth's atmosphere, known also as air, is a layer which surrounds the planet Earth and is held in contact with the surface by the gravity of the Earth. The importance of monitoring atmospheric pollutants is related to the impact on the health of the population and environment. People are exposed to so-called "indoor" and "outdoor" pollutants depending on individual activities. In this work we present the temporal dynamics of atmospheric pollution using as study case the city of Galati. The target trace gases are: nitrogen dioxide, ozone, and benzene.

*Keywords*: nitrogen dioxide, ozone, benzene, statistics

# COMPARATIVE STUDY REGARDING THE RISK PERCEPTION OF TSUNAMIS FROM EFORIE NORD (ROMANIA) AND NICE (FRANCE) COMMUNITIES

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## ABSTRACT

The goal of this paper is to present a comparative study of the people perception from two different sites from Romania and France, regarding the tsunami risk in the Black and Mediterranean Seas communities. These two surveys over residents' and tourists' perception and preparedness of tsunami hazard were carried out for both towns in the frame of the ASTARTE project (EC Programme FP7). The data was collected by tsunami questionnaire developed in the project and the questions are referring to: interviewee's relation to Eforie Nord and Nice sites, information about interviewed people, tsunami hazard knowledge/risk perception, evacuation issue, awareness of the existing warning system, information, and communication. A total of 256 subjects were participated at surveys from both sites situated along coasts of Black and Mediterranean seas.

The results showed a moderate level of tsunami preparedness and perception of people living in, working in, or visiting Eforie Nord and Nice, our respondents mentioned the tsunami as third rank in both sites, coming after earthquakes and storms/pollution.

When considering a future tsunami being generated in Eforie Nord, 36,3% of the respondents think that the place could be affected by a tsunami and the waves could reach more than 2-5 meters (heights cited by approx. 14% of respondents) or even more than 5-10 meters (values cited by 15% of interviewed people). Regarding the Nice site, 78% of the respondents think that the place could be affected by a tsunami in the future.

This study provided evidence that tsunamis recently occurred in the world have a significant impact on people's preparedness and perception.

*Keywords*: earthquake, tsunami hazard, tsunami warning system, resilience

# MEASUREMENTS OF TROPOSPHERIC NO2 USING IN-SITU AND MOBILE DOAS OBSERVATIONS

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## ABSTRACT

In this work we present the in-situ and mobile DOAS observations of NO2 using a car vehicle. The target trace gas is the nitrogen dioxide (NO2). NO2 is an important toxic atmospheric trace gas with a negative effect on the atmospheric chemistry, human health and environment. The study is focused over Bucharest city (44.43°N, 26.10°E), the main and largest city from Romania. The main source of pollution in Bucharest city is represented by the emissions from the road transports, local industry and some power plants. The DOAS instrument onboard the car vehicle is based on a compact UV-Vis spectrometer and a GPS connected to a portable PC. We present the map of NO2 pollution over Bucharest city using mobile DOAS obserations and in-situ measurements. Also, comparisons between the DOAS observations and in-situ measurements are presented.

*Keywords*: mobile DOAS, in-situ, nitrogen dioxide

# HYDROGEOCHEMICAL FEATURES OF THE MINERAL WATERS FROM CIOMADUL VOLCANIC AREA, (EASTERN CARPATHIANS, ROMANIA)

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## ABSTRACT

Naturally sparkling mineral waters represent an important natural asset of the Romanian segment of the Eastern Carpathians. Along the Neogene volcanic chain, and even at a significant distance from the volcanic structures, strong CO2 emissions occur, generating mineral waters and dry mofettes. These features are particularly active in the southern part of Harghita Mountains, where the youngest volcanic structures, Neogene to Quaternary in age, are located. Ciomadul volcanic complex is the most representative structure in the area, and we have chosen it for a preliminary hydrogeochemical study based on chemical and isotopic analyses. A total of 46 water samples were collected from different environments: springs, wells, wet mofettes, St. Ana Lake, and Mohos peat bog. As shown by the 18O and 2H isotopes, the investigated waters belong to the meteoric cycle. Their chemical composition reveals different degrees of water â€“ rock interaction, strongly influenced by the presence of gas. Two main hydrochemical types may be distinguished, Cad€-SO4-type and Na(+K)d€-Cl type, reflecting the influence of the substrate, volcanic rocks in the first case, and sedimentary (flysch) units in the second case. Very acidic waters, with the pH close to 1, have been found at the Apor and Gyogyvizek sites, while in the others the waters are still acidic, but to a lower extent, or circumneutral. The decreasing pH of water enhances mineral dissolution and water-rock interaction The Giggenbach ternary plot shows that with few exceptions, the investigated waters are immature. The collected data and interpretations contribute to a better knowledge and potentially better management of the mineral water resources in the investigated area.

*Keywords*: mineral water, stable isotopes, hydrochemical facies, Ciomadul, Eastern Carpathians

# PROBABILISTIC MODELLING OF CONSUMER EXPOSURE TO PESTICIDE RESIDUES IN TOMATOES

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## ABSTRACT

The evaluation of consumer exposure to pesticide residues is a significant step that can influence pesticide regulatory aspects. Probabilistic modelling using Monte Carlo simulation is identified as a promising tool for this purpose. This tool allows us to define a conceptual model for dietary exposure to pesticide residues in vegetables and not only. In this study we considered the analysis of variability as a step for risk assessments. The estimation of exposure of adults, adolescents (10-14 years) and children (3-10 years) to different pesticide residues (chlorothalonil, myclobutanil, folpet, tebuconazole, captan, triadimenol, deltamethrin, alpha-cypermethrin, lambda-cyhalothrin, chlorpyrifos-methyl, bifenthrin, metalaxyl-M) found in tomatoes after multiple treatments is selected as an example for this study.
In Monte Carlo analysis, distributions of output (in our case exposure to residues of pesticides) are simulated by drawing random values from distributions of the input functions variables (tomatoes consumption rate, residues levels in these commodities, individual body weights). The outputs from the simulation were given as a probability of exceeding a given toxicological limit (chronic reference value, RfD and acute reference value, ARfD). Our results indicated that the consumption of tomatoes with pesticide residues applied in multiple treatments is higher for children compared to adolescents and adults.

*Keywords*: probabilistic modelling, pesticide residues, toxicological reference doses, tomatoes

# EFFECT OF LIQUID DETERGENTS ON THE BIOMETRIC AND PHYSICO-CHEMICAL PARAMETERS OF SOME PLANTLETS

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## ABSTRACT

The present study uses different physico-chemical methods to compare the impact of non-biodegradable liquid detergents on the environment with the one based on biodegradable origin. In this context, this study focuses on specific modifications of the physico-chemical characteristics of some plantlets (e.g. Phaseolus vulgaris and Petroselinum crispum) induced by liquid detergents present in the soil, both bio-based and without environmental compatibility.
During the study, the plantlets were observed in their first stage of vegetative development through the analysis of certain biometrical parameters such as: hight development and the number of leaves as well as colour changes or various irregularities that appeared during the experiment.
The results of this study showed that the presence of non-biodegradable liquid detergents in soil, in various concentrations: 0.125%, 0.25% and 0.5% (wt/wt), calculated on water mass, induces a totally inhibiting effect upon the plantlets' growth. In the other cases, a more or less significant growth in the plantlets' height was recorded. Moreover, additional investigations showed that the number of leaves is an indicator which decisively depends on the interaction between the species and the detergent. On the other hand, the analysis of the biometrical parameters constitutes an aspect which determines, directly or indirectly, the resistance of the species of plantlets to the action of liquid detergents.
Furthermore, the catalase activity of Phaseolus vulgaris and Petroselinum crispum is believed to be associated with the presence of liquid detergents in soil especially the detergent without environmental compatibility which diffuse into and damage cell membrane structures and
thus affects the metabolism of both plants.

*Keywords*: biodegradable, catalase activity, colorimetric parameters, without environmental compatibility

# A GIS-BASED TOOL FOR LARGE SCALE ANALYSIS OF DIRECT ECONOMIC FLOOD DAMAGES IN DATA-SCARCE ENVIRONMENTS: THE CASE STUDY OF ROMANIA

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## ABSTRACT

The damages caused by floods are increasing worldwide having a great impact on societies. This fact highlights the need for large-scale flood damage assessment based on comprehensive approaches that include all the components of the risk; this trend being also supported and encouraged by the Flood Directive (FD) implementation. Furthermore, the growth and development of tools and models that can be used for flood hazard and flood consequence analysis play an important role in the flood management process and in the implementation of the FD. Moreover, the increasing availability of high-resolution Earth Observation (EO) data, e.g. Landsat 8, ERS, ASAR and TerraSAR-X, represents an important source of information in data-scarce environments for the assessment of several natural hazard scenarios. In this context, GIS (Geographic Information System) free and open source tool were developed for the analysis and mapping of geospatial EO data lowering the financial barriers to describe risks at continental and national levels. Large-scale flood damage assessment have an important role in the identification of high flood risk areas, in the decision making process, in the planning of flood management strategies and risk reduction. It also offers support for national and global policies, for the prioritisation of investment at national level or it provides flood risk information to the insurance industry and large companies.

Nowadays, the approaches at large scales present gaps given by the lack of consistent data over large areas and the lack of high resolution data. The resolution of current analysis in the field are ranging from 100 m to 1 km, the improvement of this coarse resolution being done by applying downscaling methods or meso-scale assessment are done and merge together. However this approaches induce inconsistencies in the results. Therefore, in order to provide high-resolution data and consistency in the results one method must be applied for the whole area. This can limit the choice of the methods that can be used, simplified approached being needed.

In this paper, a new large-scale flood risk assessment methodology is proposed combining EO high-resolution data (30m resolution) and free and open-source GIS tools. Firstly, a GIS-based model, named *Geomorphic Flood Area tool (GFA tool)*, that is based on a geomorphic method, was used for rapid and cost-effective flood extent and water-depth mapping over the entire territory of Romania adopting the SRTM (Shuttle Radar Topography Mission) at 30 m resolution and the Pan-EU flood-hazard map (with return period of 100 years) at 100 m of resolution (resampled at 30 m) to generate an extended version of the map, covering the entire territory including second and minor rivers which usually are not considered in large scale analysis.

A machine learning technique is used to perform a supervised classification, taking as training data the Urban Atlas land-use maps available for the main cities in Romania, in order to obtain a land-use map from Landsat 8 images at 30 m resolution over the entire territory of Romania exposed to flood.

Finally, the direct economic damages were calculated using a freeware GIS software, named *FloodRisk*, combining the previous estimated hazard and exposure data and the so called damage functions, i.e depth–damage functions that combine the type of land-use and the inundation depth.

The main limitation of the proposed approach is related to the fact that the flood defense measures are not considered in the analysis and the simplified procedures may decrease the accuracy of the results. However, the proposed methodology, applied and tested in the entire territory of Romania, can be applied over large areas with limited availability of data and where hydrologic and hydraulic studies have not been or cannot be conducted, offering high-resolution results.

The main goal of this study is to offer a cost-effective and parsimonious approach that can provide solutions for the current principal gaps in large-scale flood risk assessment and could support different stakeholders in their compliance with risk map delineation and the management of current and future flood risk.

*Keywords:* flood damage, GIS tool, high-resolution data, Landsat 8, DEM

# INDOOR RADON SURVEY IN ROMANIA LINKED WITH RADON LEGISLATION AND NATIONAL RADON ACTION PLAN

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## ABSTRACT

The European Council Directive 2013/59/EURATOM (EU-BSS) is in the process of transposition into national legislation in EU member states, lays down legal limits for radon concentrations in indoor air, with the general objective to reduce the risk of lung cancer for European population due to high radon concentrations in indoor air.
Starting from 2017, the radon problem was assumed in Romania at national level by responsible authorities through the design and the development of a National Radon Action Plan.

A large number of indoor radon measurements have been conducted by our group through the scientific research projects implemented at Babeş-Bolyai University in the last 6 years in order to complete the Indoor radon Map for Romania.
In the framework of the SMART_RAD_EN project, the Romanian indoor radon map was completed this year with 2000 new data displayed on the map, for five major agglomerations with a high density of population and settlements. The local grids cover in details our major populated areas from Romania, as a combination of geographically based and population-weighted survey.
In this paper, a summary of the current status of the Romania Radon Action Plan, together with scientific results in radon field, is presented.

*Keywords*: National Radon Action Plan, radon map, indoor radon.

# PRELIMINARY RESULTS OF GROUND - BASED COLUMN GREENHOUSE GASES RETRIEVAL USING FTIR SPECTROSCOPY

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## ABSTRACT

Atmospheric methane is one of the most important anthropogenic greenhouse gas and it also has an indirect effect on climate through chemical feedbacks [1]. Better knowledge of the methane distribution and emissions is indispensable for a correct assessment of its impact on global climate change [2]. Retrievals of column abundances of methane were used from a low spectral resolution (0.5cm-1) tabletop FTIR system, EM27, by analysing direct solar radiation [3][4]. Retrieval of the atmospheric column greenhouse gases uses a-priori profiles of the interested species and pressure and temperature profiles. The results are compared using pressure and temperature profiles obtained from model and compared with the temperature and pressure profiles obtained from a collocated infrared radiometer.
This paper presents retrievals from EM27 system during summertime of 2017 over Magurele (44.35N, 26.03E, 93m asl), a peri-urban area located approximately 10 km south of Bucharest.Measurements are compared with satellite retrievals from IASI (Infrared Atmospheric Sounding Interferometer). The retrieval from EM27 can be improved using measured meteorological parameters instead of modelled data as input.
In this study possibility of using microwave radiometer temperature profiles for the ground – based retrieval algorithm is explored. Satellite data were selected by defining an area of approximately 50 km around the ground based system. Comparison with ground based measurements are made within a ± 1 hour from the satellite overpass the ground based location. The improved retrieval of greenhouse gases of this system can be suitable as a validation tool of ESA's Sentinel 5 Precursor, as it covers the same spectral region as used by the infrared channel of the TROPOMI (TROPOspheric Monitoring Instrument).

*Keywords*: satellite, FTIR, intercomparison, infrared radiometer, greenhouse gases

# EFFECTS OF PARTICLE SIZE DISTRIBUTION ON HEAVY METALS CONTENT IN SOILS AND SEDIMENTS ALONG THE LĂPUȘ RIVER (MARAMUREȘ COUNTY, ROMANIA)

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## ABSTRACT

The abandoned mining sites related to uncontrolled mine waste and acid mine drainage are one of the most serious environmental problems in Romania. Mining activities affect relatively small areas but can have a large local impact on the environment. Sediments can store large quantities of heavy metals, playing an important role in heavy metals distribution in surface waters.
The research area of this study is located close to Târgu Lăpuş City (Maramureş County, Romania), in the north-western part of Transylvania. The Lăpuș River flows through a region that has a long history of precious and base metal mining. Băiuț mine is located about 45 km east of Baia Mare, one of the country's most problematic regions in terms of historical pollution.
The hydrological basin of the Lăpuș River can be divided into three sectors that correspond to three morphological units: the mountainous area, the hilly area and the floodplain area. Folk and Ward parameters were studied for these three morphological units in order to examine the behavior of the toxic elements in the different type of sediments.
The main objectives of the present study were: (1) to investigate the heavy metal distribution in soils and sediments along Lăpuș River; (2) to identify the correlation between the grain size and heavy metal distribution within the Lăpuș River and its tributaries; and (3) to evaluate the heavy metal pollution level of soils and sediments by calculating specific indices. A total of 53 soil and sediment samples have been collected along the Lăpuș River course and its tributaries and from the agricultural fields, during spring and early summer of 2014. Based on the grain size distribution, the following parameters have been investigated: the mean grain size (Mz), the dispersion (σ), the skewness (Sk) and kurtosis (KG).
In order to measure the heavy-metal pollution level, three typical indices were calculated: the enrichment factor (EF), pollution load index (PLI) and sediment pollution index (SPI).
The results indicate that the heavy metal distribution in sediments along Lăpuș River can be correlated with the grain size. Based on the calculated indices, most of the investigated sediment and soil samples can be classified as polluted.
Overall, the obtained results indicate that the natural environment surrounding Băiuț mining region is severely polluted by heavy metals (Cd, Pb, Zn, Cu, Ni, Cr). The balance of the mean concentrations indicates that the mountainous area is acting like a source of these elements which are continuously generated and transported toward hilly and floodplain areas, mostly during the floods.
This distribution pattern can be classified as a dangerous one due to the fact that the toxic elements can be accumulated in feedstuff, in crops and finally, in human food.

*Keywords*: heavy metals, historical mining, grain size, pollution indices

# FORESTS OUTSIDE THE NATIONAL FOREST FUND - AN ADDITIONAL EXPLANATION FOR FOREST DISTURBANCES IN ROMANIA

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## ABSTRACT

Over the last 25 years changes in the land use in Romania have been widespread. Many research papers have identified several drivers for these changes and have highlighted a link between the return to private ownership and the changes that have affected the forests. In this study, we investigate the way forest management policy influenced these changes; there are important differences between forests included in the national forest fund and forests outside it. While the former are more rigorously managed on the basis of Forest Management Plans, vegetation outside the forest fund is more exposed to intensive exploitation due to its association with agricultural land without consistent legal protection. Taking this into account, the spatial distribution, especially the deforestation hot-spots and the intensity of forest decline in Romania get a more nuanced explanation.

*Keywords*: land use changes, forest disturbances in Romania, forests outside the National Forest Fund

# ECO-FRIENDLY RECYCLING POTENTIAL OF MICROWAVE MELTING FOR THE RECOVERY OF USEFUL AND PRECIOUS METALS FROM E-WASTE

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## ABSTRACT

The processing of waste electrical and electronic equipment (WEEE) has become an issue of significant importance due to the large volumes being generated and to the content of rare and valuable metals as well as environmentally toxic materials (organic compounds). Presently, WEEE is regarded as an important secondary resource of useful metals. The aim of this study is to evaluate the content of base and precious non-ferrous metals in such wastes collected in Romania and to assess the potential of their recycling through processing in microwave field.
Electric and electronic wastes are complex mixtures of materials and components, with chemical compositions which depend on their sources (printed circuit boards - PCBs, mobile phones, television and radio sets, home appliances, industrial equipment). In PCBs the metallic fraction is of approximately 30-50 wt.% (with 45-65 wt.% Cu, 0.5-20% Pb, 15-25% Sn, 5-8% Zn, 0.4-0.8% Ag, 0.08-0.2% Au and 2-5% other metals such as Fe, Ni, Al, Sb, Cr, Mn etc.). The non-metallic fractions, which account for 50-70 wt.%, contain substances such as brominated flame retardant, thermosetting resin, reinforced materials and other toxic and hazardous organic compounds. The combustion of these materials during the pyrometallurgical processes may cause serious environmental problems, due to the generation of toxic gases.
The microwave melting of WEEE represents a promising state-of-the-art, ecological and energy efficient alternative for the conventional methods with a remarkable applicative potential. The advantages of this method are: i. reduced melting time with energy savings of 30-40%, compared to traditional processes (a microwave furnace can easily attain temperatures up to 1600°C in less than 30 minutes); ii. low content of organic substances. iii. facile extraction of the enclosed metal fractions; iv. improved process control; v. absence of direct contact with the melting materials and vi. environmental-friendly approach through the possibility of treating the toxic gas emissions in a microwave field at high temperatures (1300 ÷ 1400 0C).

*Keywords*: e-waste, recycling, microwave field, non-ferrous metals

# MODULAR CLOSING BY VALORIFICATION OF S.C. SOMETRA S.A. INDUSTRIAL LANDFILL, COPŞA MICĂ, SIBIU COUNTY

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## ABSTRACT

The issue of waste generation and management resulting from human activities is of great relevance throughout the world today. The European Union's waste management policy is focused on the sustainable use of natural resources and waste management in a “recycling society”, respecting the waste hierarchy as follows (in order): prevention of waste generation, preparation for re-use, recycling, recovery by other methods, disposal by storage.
For decades, the activities of industrial enterprises have led to the emergence and development of large, non-compliant industrial waste landfills, collectively referred to as "historical landfills". In most cases, the closure of these "historical landfills" in Romania represents a real challenge, primarily due to the lack of a specific legislation for such deposits, and last but not least because of the excessively high costs.
S.C. Sometra S.A. from Copşa Mică, the owner of such a landfill site resulting from the enterprise's activity over more than 75 years, proposes a modular closure model by recycling and recovering various waste categories existing on site through technically and economically feasible methods, in parallel with modular greening works for the resulting waste-free areas. The proposed project combines legislative provisions at European and national level on waste management and waste disposal.

*Key words*: waste management, sustainable use, waste hierarchy, historical landfills, closure of landfills, modular closure by recycling and recovery

# AN AUTOMATED, MULTI PARAMETER, DEM-BASED FLOOD RISK WATERSHED MODEL FOR MOUNTAINOUS REGIONS, USING ARCGIS (MODEL BUILDER)

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## ABSTRACT

From historical times, floods have always been one of the major concerns in risk manifestation upon human societies. Their thorough study and analysis is crucial for the better understanding of the way they manifest, under different morphometric conditions. The first and most important hydrological unit from which all flood studies proceed, is the drainage basin. It represents the fundamental hydrological entity, that can be associated with numerous parameters that play an important role in the manifestation of floods, and it is most relevant in the mountainous region, where floods are characterized by higher energy and speed. This study presents an automated GIS model, that uses a single DEM as input, in order to generate vector layers with a complete flood analysis attribute table attached, that includes numerous morphometric parameters, such as elongation ratio, circularity ratio, relief ratio, roughness number, drainage density, topographic wetness index, hypsometric integral etc. The entire model is based on over 200 tools, linked together in Model Builder (ArcGIS), and it only requires the user to select a DEM, a Horton-Strahler stream order for which the model is run, and a couple more parameters, without any user intervention during the processing time of the model. There are 5 main stages that are undergone, during the processing time of the model, from identifying the main drainage basin for the main river, drawing its hydrographic sub-basins for the selected order of hierarchy according to the Horton-Strahler classification system, the calculation of each parameter for each sub-basin, a normalization stage, and the calculation of vulnerability values for each basin. There are numerous advantages for implementing this model on elevation models, such as minimal amount of knowledge and time required to run a watershed flood risk simulation, the versatility to choose a wide range of types of DEMs' (SRTM, LIDAR, Structure From Motion models etc), the results are compact and easy to view and interpret, and are based of multiple parameters, which directly influence the intensity and concentration time of floods. The conceived model can be a valuable tool for fast, large-scale drainage basin - flood analysis, in research, risk management, hydrology and other fields.

*Keywords*: automation, drainage basin, flood risk, GIS, model builder, watershed

# WHAT HAPPENED AT FUKUSHIMA? MARCH 11, 2011

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## ABSTRACT

At the Fukushima Daiichi Nuclear Power Plant from Japan, on March 11, 2011 there were six nuclear reactors, of which the U1, U2, and U3 units were in operation, and the U4, U5 and U6 units were shut down.
At local time 14h 46 min (8h 46 min of Bucharest time) there was a strong earthquake in the vicinity of the eastern shore of Japan, with magnitude of 9 on the Richter scale.
At the time of the earthquake, the units U1, U2 and U3 stopped automatically by inserting the control bars, thus stopping the nuclear reaction taking place in the core of the reactor. But the residual heat left in the reactor has given them great headaches to the Japanese and the entire world.
The earthquake destroyed the external power grid that fed the nuclear reactors, stopping the operation of the pumps that ensured the flow of the coolant.
Then came the tsunami wave, much higher than planned by the plant designers (6.5 meters), which stopped the operation of the electric generators and batteries, which were later switched on, and, implicitly, the pumps of the cooling agent. Residual heat could not be evacuated outside of the the reactor.
It was necessary that the steam in the active area of the reactors, under very high pressure, should be evacuated urgently outwards. But the hydrogen present in that steam has caused strong explosions when in contact with outside air, explosions that have affected metallic protective tires and destroyed the reactor buildings. In the evacuated steam there were different amounts of radioactive elements, elements that came into the surrounding air.
The highest radioactivity values of environmental factors in Japan were recorded between March 20th and 24th, 2011, and in some regions near the plant, the radioactiv iodine and cesium concentrations from the damaged plant, exceeded the maximum admissible values. Population from some localities was temporarily evacuated, stable iodine tablets were administered for saturation of the thyroid gland and restrictions on the marketing and consumption of vegetables, drinking water and milk were imposed.
Given the air mass flow during the radioactive emissions, the very large distances that contaminated air masses have crossed since the emission, for Europe and implicitly for Romania, the I-131 radioactive emissions that occurred accidentally during the period March 14 - 30, 2011, at the Fukushima - Daiichi nuclear power plant did not represent a radiological risk.

*Keywords:* Fukushima, earthquake, nuclear power plant, residual heat, radioactive elements

# THE TECHNICAL EVALUATION METHODS OF DISASTER MANAGEMENT IN HUNGARY

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## ABSTRACT

Health, sustainability, safety play primery role in human life nowadays. One of the most important pillar of general safety is the disaster management. The necessary safety requirements based on laws all over the world. We are formed the adequeta, modern protection features of those, with risk assessment, technical evaluation, hazard analysis. We are demonstrated in this announcement the summary on the technical evaluations based risk assessment, which allowes the effective protection quality of disaster management, and solves the further developement. In our article we point out the dynamically developing technical, technologycal, and on info-communication based systems, to manage certain technical safety directions with engineering considerations, to effectively monitor the development of very fast-paced developments through official means, and to modernize the direction of development. Summarizing the characteristics of contemporary protection tasks and the importance of the resulting technical content we highlight the major role of the engineering education of the future generations.

*Keywords*: disaster management, fire protection, industrial safety, engineering methods, technical evaluation

# TURNING BIODEGRADABLE WASTE FROM COST GENERATOR TO PROFIT GENERATOR. COMPOSTING WITH GORE® COVER TECHNOLOGY

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## ABSTRACT

The aerobic digestion systems with Gore® Cover technology provides ideal conditions for the treatment of biodegradable waste in conditions of economic efficiency, safety and environment protection. It is a fully enclosed, aerobic, digestion system for biodegradable waste using semi-permeable membrane and positive forced aeration. This system provides a hygienic concept of the treated material and compost production for 365 days/per year and eliminates inconveniences caused by odors and other emissions. It has the lowest operating costs compared to other composting technologies currently available on the market. The waste that can be treated with GORE® Cover technology can be: waste from agriculture and forestry, slaughterhouse waste, farms, meat processing industry, manure, garden waste, waste from wood industry, food waste, green waste from parks and public gardens. Nowadays, we are running tests to replace the structural material with alternatives.

*Key words*: biodegradable waste, organic waste, compost, semi-permeable membrane, aerobic digestion, food waste, green waste

# RECYCLING OF LEAD ACID BATTERIES: A REVIEW OF CURRENT PROCESSES AND TECHNOLOGIES

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## ABSTRACT

The aim of this paper is to review the status of technologies applied to recycle lead acid batteries. A great effort to recycle batteries has been performed in the last two decades. During this period new directives have been published specially in Europe. In most cases lead acid batteries are treated and recycled using the pyrometallurgical and hydrometallurgical techniques. However, these techniques have some important disadvantages: i) the small lead recovery rate (due to the rapid oxidation of the electrolytic Pb powder in the atmosphere); ii) the important amount of energy and time spent to convert oxides and sulfates in to metal, which is subsequently reconverted to oxides; iii) the harmful emissions and their negative environmental impact.

*Keywords*: lead acid batteries, Recycling

# ISSUES ON RADIOLOGICAL EMERGENCY RESPONSE IN HUNGARY

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## ABSTRACT

Nowadays, the global use of atomic energy, i.e. the application of radioactive and nuclear materials leads to a rising risk of the occurrence of a radiological emergency. Although these emergencies are very rare, disaster management as one of the first responders must be aware of and prepared for such situations, since their effects on the environment and human health could be serious. Therefore quick and efficient firefighter reaction can be critical meanwhile radiation protection of the interveners is crucial.
The aim of the presentation is to introduce the features of radiological emergencies in general, to show the Hungarian system of response and to highlight some special points to develop.

*Keywords*: disaster management, firefighter, Hungary, radiation protection, radiological emergency

# CLIMATE CHANGE AND URBAN ENERGY PRACTICES: RATIONALIZATION OF ENERGY CONSUMPTION IN SHOWER SYSTEMS OF RESIDENTIAL HOUSING

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## ABSTRACT

Due to the energy consumption, buildings are responsible for much of the CO2 emissions. The EU has introduced in its policies for the reduction of carbon dioxide emissions a binding 20% target by 2020 and the ambitious target of reducing these emissions up to 80-90% by 2050, against a 1990 baseline. Inside the buildings, 60% of the water use is heated for tubs, sinks, showers, dishwashers and clothes washers, thus the residential wastewater is characterized by higher temperature. The drain water can be an important secondary energy source that can be recovered and capitalized inside the buildings. This paper investigates the potential of drain water resulting from shower and the technological solution for heat recovery. The paper is focused on the analysis and development of a drain water heat recovery unit (DWHRU) for household shower. The experimental research results show the possibility of recovering the heat from drain water resulting from showers by using a heat exchanger. The results also demonstrate that such a DWHRU may be economically viable depending on some factors. Through the implementation of this technology, an important potential can be the reduction of energy consumption and greenhouse gas emissions at national level.

*Keywords*: energy efficiency, drain water heat recovery unit, hot water shower, sustainability, waste heat recovery

# EW MODIFIED-CHITOSAN FOR IMPROVED HEAVY METAL ADSORPTION FROM WASTEWATER

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## ABSTRACT

Enrichment of contaminants due to industrialization and urbanization has been recorded throughout the world in the last two decades. Heavy metal contamination due to both natural or anthropogenic sources has become a global concern. Metal release in the environment threatens human health mostly because of their persistence and accumulation in the food chain. Integrated study of both natural water quality and wastewater provides important information regarding the human impact activities in the environmental landscape. Nature provides a wide range of materials with different functions, which serve as a source of bioinspiration for materials scientists. We chose for our work chitosan and p-hydroxy mandelic acid, which are two examples of natural materials. We report here the functionalization of chitosan with poly(benzofurane-co-arylacetic) acid able to complex this type of contaminants. Such natural materials can be easily prepared with low cost and separated by filtration and thus offer attractive ways of wastewater treatment. The synthesized polymer was structural investigated by SEM, EDX, TGA, XPS, FTIR and the heavy metals were determined by AAS analysis.

*Keywords*: heavy metal contamination, environment, wastewater treatment, natural materials, poly(benzofurane-co-arylacetic acid)

# FIBROUS MATERIALS FROM AGRICULTURAL WASTE FOR SUSTAINABLE PAPER MANUFACTURE. THE CASE OF ROMANIA

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## ABSTRACT

The production of corrugated board has developed continuously in Romania, over the last 5 years the average growth rate being about 6%. In 2017, more than 300,000 tons of packages made from corrugated board were produced. Under these circumstances, paper consumption has grown and diversified in line with the dynamics of cardboard production. In Romania, the main types of paper for corrugated cardboard (testliner, wellenstoff and schrenz) are manufactured, the raw material being recovered paper. The short and medium term projections show that the current growth rate of corrugated cardboard production will continue, which will also boost paper demand. The amount of recovered collected in Romania is currently limited to approx. 400,000 tons/y and is insufficient for the needs of the paper sector. The growth of paper production must be accompanied by the provision of fibrous raw materials (recovered paper, pulp). The amount of recovered paper that can be additionally collected in Romania is approx. 200,000 tons/y and consists of inappropriate classes for corrugated cardboard production. Importing of recovered paper is a solution, but it raises problems with the quality and additional shipping and storage costs. Extending the production of pulp from wood is associated with high pollution generated by pulp manufacturing and an increased carbon footprint. Under these conditions, the domestic raw material base must be diversified, the only solution being the manufacture of pulp in Romania from other fibrous raw materials, so as to improve the environmental and economic performances of corrugated cardboard manufacturing.
The paper deals with the possibilities of supplying the Romanian paper sector with raw materials other than recovered paper or wood. Considering the difficulties of supplying large quantities of wood, the paper presents the alternative of the use of non-woody plants to obtain some sorts of fibrous materials. In this regard, experimental results are presented using agricultural waste (wheat straw and corn stalk) for the production of pulp. It discusses the procedures involved, the working parameters and characterizes the obtained fibrous materials.

*Keywords*: agricultural waste, carbon footprint, fibrous raw materials, non-woody plants, pulp production

# LIFE CYCLE ASSESSMENT OF DIFFERENT PALLET TYPES

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## ABSTRACT

Pallets are omnipresent in trade and logistics. Their use improves goods handling processes and reduces storage costs. If they are reusable, they are all the more advantageous. Reusable pallets are more durable since a reduction in pressure and the use of materials could result. This paper describes and compares the life cycle and the environmental impacts of different pallets manufactured from various materials: wood, plastic, metal and corrugated board. Considering the cradle to grave approach, the comparison is performed by including the following phases of the life cycle: source of raw materials, manufacturing, transportation, utilization, maintenance and end-of-life (reuse, recycling, incineration or landfilling). The environmental impacts were determined based on life cycle assessment (LCA) methodology and GaBi software was used for modeling of life cycle inventory. The functional unit chosen for this study was 1000 pallets with delivered products.
Impact categories such as climate change, ozone depletion, acidification, eutrophication, human toxicity and others were assessed. Electricity consumption is an input that has a major influence on the wood pallets production, while manufacturing of plastic pallets involves consumption of non-renewable resource and has a higher difficulty in manufacturing than wood. It is well known that loading and handling conditions significantly influences the useful life of pallets.
Corrugated board pallets are easily damaged, suitable for a few journeys and have significant carbon emission and energy use. The environmental impacts of pallets should decrease whether waste is used as raw material.

*Keywords*: environmental impacts, GaBi software, pallets, reuse, waste

# USING THE ETAS MODEL FOR CATALOGUE DECLUSTERING AND ANALYSES SEISMIC SEQUENCE IN DANUBIAN SEISMOGENIC AREA (CRUSTAL SEISMICITY)

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## ABSTRACT

The purpose of this work consists in analyses of declustering catalogue and seismic sequences in Danubian seismogenic area. The studied area is located in the Danubian seismogenic zone, and represents the Southwest, adjacent to the Danube, of the orogenic unit of the Southern Carpathians.
Studies conducted here highlighted areas with high seismicity: The Resita-Moldova Noua area, alongside the Oravita fault, recorded the seismic sequence occurred in April-August 2002, with a total of 70 earthquakes, the maximum magnitude being 3.5 (Mw) for the earthquake of August 4, 2002 The Teregova area is where the seismic sequence from October-November 2014 was generated, the main shock with a total of 51 aftershocks that occurred after. The maximum magnitude observed was 4.1 (Mw) for the earthquake produced on October 31, 2014.
Cerna-Jiu area located along side a strike slip fault. The maximum magnitude observed was 5.5 (Mw) for the earthquake of July 18, 1991. A widely used method in seismology for assessing seismic hazard is Seismicity declustering catalogue where the seismic sequence from October-November 2014 was generated, the main shock-type with a total of 51 earthquakes. The maximum magnitude observed was 4.1 (Mw) for the earthquake produced on October 31, 201 ted in the Danubian seismogenic area, and represents the Southwest, adjacent to the Danube, of the orogenic unit of the Southern Carpathians.
The identification of spontaneous and triggered earthquakes is the basis for the development of the concept of background seismicity The goal of seismicity declustering is to separate earthquakes in the seismicity catalogue in to independent and dependent earthquakes.
In order to model seismicity declustering , the ETAS algorithm (epistemic type aftershock sequences) is used. Applying this procedure (ETAS) involves a certain degree of subjectivity that is limited, however, by the possibility of adjusting the free parameters of the algorithm by rigorous statistical criteria such as maximum likelihood.

*Keywords*: Seismic background, declustering, epidemic model, maximum likelihood

# GIS-BASED INTERPOLATION METHODS FOR SPATIAL ASSESSMENT OF GEOGENIC RADON POTENTIAL

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## ABSTRACT

Modelling the spatial variability of Geogenic Radon Potential (GRP), based on spatially continuous geological, geographical and geochemical information as proxy data, is an important task to identify radon-prone areas and provide the local administration of a useful tool for land use planning and strategies aimed at radon health risk reduction. In this work, different interpolation techniques in a geographical information system (GIS) environment are applied and compared for estimating the spatial variation of GRP in the municipality of Celleno (Lazio, central Italy). The research activity has been conducted within the European LIFE-Respire project.
Three regression models such as Ordinary Least Squares regression (OLS), Geographically Weighted Regression (GWR) and Empirical Bayesian Regression Kriging (EBRK) were applied to investigate the relationships between soil-gas radon concentrations and some proxy explanatory variables, and to generate spatial distribution of GRP. Ordinary Least Squares uses traditional regression techniques to model the relationships between a dependent variable and a set of independent variables (i.e. the explanatory variables). It provides a global model of the studied variable and creates a single regression equation to represent a process; this regression method assumes the relationship is constant over space, so the estimated coefficients of the regression are the same for all the study area.
Geographically Weighted Regression is an extension of the traditional OLS regression, but it does assume that the relationships among the independent variables are not constant over space, then GWR calculates local regression coefficients and local r-squared values (R2) rather than global parameters. Finally, Empirical Bayesian Regression Kriging is a geostatistical interpolation that uses explanatory variables in raster format to improve predictions of the dependent variable. Regression models and semivariograms are estimated locally with simulations; and explanatory variables are transformed into principle components prior to modelling to solve multicollinearity problems. The regression models have been performed using the following proxy (i.e., explanatory) variables: the natural content of the radiogenic elements (Ra, U, Th, and K), the emanation coefficient of the outcropping rocks, the diffusive 222Rn flux from the soil, the soil-gas CO2 concentration, the Digital Terrain Model (DTM) and Topographic Position Index (TPI, a DTM-derived morphometric parameter), the permeability of the outcropping rocks (derived from the map of the hydrological complexes) and the gamma dose radiation of the shallow lithology. Soil-gas radon measurements were used as the response (i.e., dependent) variable of the applied regression models. Data has been organised in two subsets (training and test data) to be used in the validation process. Results from validation technique indicate that GWR provides a local model with a better performance (adjusted R2=0.882) than the global OLS model (adjusted R2=0.573). However, the application of the EBRK will result in the best model validation (R2=0.989) vs the validation of the GWR result (R2=0.863). Research was conducted and funded within two research projects: INAIL/CNR-IGAG (P19L06) and LIFE-Respire (LIFE16 ENV/IT/000553)

*Keywords*: Geogenic Radon Potential, GIS, spatial regression

# GYPSUM-BASED MORTARS WITH ADDITION OF WASTE FOR CONSTRUCTION

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## ABSTRACT

The present study evaluates the characteristics and performances of gypsum mortars for construction, with the addition of waste resulting from the filling of metal statues. Several gypsum mortars samples prepared using 0 %, 5 %, 10 %, 15 % and 20 % wt. of waste were prepared in the laboratory and the physical and mechanical characteristics were determined. The waste oxide composition is mainly formed of 61.26 % $SiO_2$, 11.2 % $Al_2O_3$ and 23.50 % $CaSO_4$. The best results of mechanical resistances, flexural strength of 2.03 N/mm2 and compressive strength of 10.31 N/mm2, were obtained for the sample with the highest amount of waste (20 % wt.). The normal consistency paste water is about 75 % for mortars without waste. With increasing the waste content in the mortar composition, the amount of water decrease at about 50 %. It was also determined the setting time for all mortar compossitions without any setting time retarder. The initial setting time for the experimented mortar samples was 12 minutes and with increasing the waste percentage in the mortar, the setting time increased proportionally, reaching 18 minutes for the sample with 20 % wt. waste.

*Keywords*: gypsum-based mortars, waste, physical and mechanical properties

# ENVIRONMENTAL ETHICS AND SUSTAINABLE DEVELOPMENT IN BUILDING INDUSTRY: A CASE STUDY ON AGRICULTURAL WASTE USING AS AN ALTERNATIVE TO NATURAL RESOURCES DEPLETING

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## ABSTRACT

Concrete is a predominant material of the building industry, with an estimated increasing demand related to the global demographic growth. The concrete manufacturing involves the use of mineral aggregates which are mainly extracted, in Romania, from the riverbed, while in other countries rock blocks crushing is intensively used. However, mineral aggregates represent a depleting natural resource, and regardless of their process of extraction, the landscape of the involved areas is altered, and the natural habitat of some plant and animal species is affected.
In this context, the purpose of this paper is to debate aspects of environmental ethics and sustainable development including natural resources preservation and environmental protection, arguing with a case study of a concrete material manufacture in which 50% of the mineral aggregates volume were replaced by plant aggregates obtained from corn cobs and sunflower stalks. Our study releaved that the obtained material is suitable for building closures applications and the use of such plant aggregates significantly reduced its density. We consider this experiment as a part of sustainable development of human society, preserving the use of mineral aggregates; this is an ecological alternative which meets the ethical requirements for a healthy environment, offering non-pollutant variants in the context of a highly industrialized society.

*Keywords*: corn cob, sunflower stalk, concrete, vegetal aggregates, mechanical properties.

# IMPROVED BUILDING MATERIALS WITH AGRICULTURAL WASTE AS PART OF SUSTAINABLE AND ETHICAL DEVELOPMENT OF SOCIETY

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## ABSTRACT

In building industry, a sustainable and ethical development means a close connection between buildings and environment. This connection can be realized through the concept of ecological concrete or green concrete, a new idea to use less energy and produce fewer CO2 emissions in making a concrete based on environmentally friendly materials. The obtaining process of the cement and mineral aggregates from the concrete composition generates pollution through greenhouse gas emissions. Moreover, the extraction of the raw materials affect the habitats of the sites and of the neighboring areas.
The use of plant aggregates such as corn cobs and sunflower stalks in the concrete composition is an ethical and ecological solution for reducing the pollution related to concrete production. These raw materials are large available, easy renewable, and lead to reducing the final costs of concrete production.
The presented experimental research aimed to find solutions for enhancing the adhesion of vegetal aggregates with the cement matrix, in order to obtain a material with optimal mechanical properties. For this purpose, several variants of additives and cement partial substitution were tested in two concrete formulas with each 50% corn cob or sunflower aggregates as replacement materials of mineral aggregates. The obtained results showed that plant aggregates can be used to obtain a building material which can be improved by using partial substitution of cement by silica fume, fly ash, or by using additives (sodium silicate and air entraining additive). The developed concrete can be applied in closures and finishes.

*Keywords*: corn cob, sunflower stalk, concrete, fly ash, silica fume

# QUALITY AND HUMAN HEALTH RISK ASSESSMENT OF METALS AND NITROGEN COMPOUNDS IN DRINKING WATERS FROM AN URBAN AREA NEAR A FORMER NON-FERROUS ORE SMELTER

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## ABSTRACT

Quality and potential health risk of drinking waters in Medias town, localized near a former non-ferrous ore smelter, in Romania, was assessed using drinking water quality index (DWQI) and hazard quotients (HQ). The inhabitants use private wells and public springs as drinking water sources, located in relative proximity of agricultural, industrial and household contamination sources. The obtained results indicated high NO2-, NO3-, Cd and Mn levels, which exceed the maximum allowable concentrations. According to DWQI, about 10 % of waters were classified as having acceptable quality, 21 % have threatened quality, while 69 % have a poor quality. The potential health risk assessment suggested an increased risk for NO3-, as more than 72 % of the drinking water sources presented HQ > 1.0 and no risk for metals and NO2-.

*Keywords*: drinking water quality index, health risk assessment, metals, nitrogen compounds

# USE OF SATELLITE DATA IN DATA FUSION METHODS FOR AIR QUALITY MAPPING

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## ABSTRACT

Air quality mapping plays an important role in informing the public about air pollution levels in various areas. The most often used data sources for air quality mapping are in-situ measurements and chemical transport model (CTM) outputs. Next to these data sources, satellite resp. earth observation data show a large potential for the maps improvements. None of these datasets alone is ideal for mapping purposes due to either substantial data gaps, significant uncertainties and biases, or insufficient spatial resolution. Within the scope of the SAMIRA (Satellite based Monitoring Initiative for Regional Air quality) project, combination of these different data sources using data fusion, namely residual kriging methods is explored, in order to provide more accurate air quality maps.

Here, we present first results of the on-going project where we have applied multiple linear regression and spatial interpolation of its residuals (residual kriging) for combining in-situ measurement data, chemical transport modelling outputs and satellite observations over the Czech Republic and a major part of Europe. We have focused on four pollutants (NO2, SO2, PM10 and PM2.5) at different temporal resolutions (annual, daily, hourly).

Satellite data usually suffer from spatial and temporal data gaps. To reduce these gaps we merged data from two different sources, namely products OMNO2 and GOME-2 of AURA and MetOp satellites respectively. The gaps were further filled by spatio-temporal interpolation using the Gapfill package in R language.

For mutual comparison of different mapping methods, we have used the ‘leave one out cross-validation method. Our first results show that including the satellite observations in air quality mapping provides slight improvement in terms of cross-validation root mean square error and bias, for some pollutants and time steps.

*Keywords*: air quality, satellite data, interpolation, data fusion

# ASSESSMENT OF WATER QUALITY PARAMETERS IN LAKES FROM BUCHAREST-ILFOV AREA, ROMANIA

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## ABSTRACT

The high degree of urbanization, the industry development and diversification of the chemical structure of day to day products have increased the pressure on water resources [1]. When water quality is affected by the presence of different types of pollutants, it can lead to the emergence of many types of infectious diseases and non-infectious diseases like nitrate intoxication and metal poisoning [2, 3]. Therefore, water quality monitoring is a necessity for the efficient management of the water resources and for the aquatic biodiversity protection.

The present study is aimed to assess the water quality status in the Mogooaia, Herastrau and Pantelimon Lakes (July 2016 and September 2016) based on physico-chemical parameters (water temperature (T), pH, electrical conductivity, turbidity, dissolved oxygen (OD), chemical oxygen demand (COD and CCO-Mn), 5-days biochemical oxygen demand (BOD), total suspended solids (TSS), chloride ($Cl^-$), calcium ($Ca^{2+}$), magnesium ($Mg^{2+}$), sodium ($Na^+$), ammonium-nitrogen ($NH_4$-N), nitrate-nitrogen ($NO_3$-N), nitrite-nitrogen ($NO_2$-N), total nitrogen (TN), total phosphorus (TP), orthophosphates ($PO_4$-P), phenol, methylene blue active substances (MBAS) and heavy metals (Cd, Pb, Cu, Cr, Ni, Zn, Mn și Fe).

Following the overall assessment, the physico-chemical parameters analyzed in the three lakes were included according to M.O. 161/2006 in I-IV quality classes. Specific values for the IV quality class were recorded only for the nitrites determined in the water samples collected from the Mogosoaia and Pantelimon Lakes in September 2016.

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*Keywords*: water pollution, physico-chemical parameter, lakes

# THE DEVELOPMENT OF AN INNOVATIVE MONITORING SYSTEM FOR INDOOR AIR QUALITY

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## ABSTRACT

Reducing exposure to radon in buildings is a key priority of public health protection against radiation, as a consequence of the European Council Directive 2013/59/EURATOM (EU-BSS), which is in the process of transposition into Romanian legislation. According to this situation, a smart prototype system for continuous monitoring and remote data transmission on radon levels and other household air pollutants was developed in the framework of the SMART_RAD_EN project. The data monitoring and remote transmission system can be characterized as an electronic device developed around a microcontroller containing radon, VOC, CO, $CO_2$, ambient temperature, humidity and atmospheric pressure sensors. The microcontroller collects data from the attached sensors and through an ethernet connection these data are centralized by a dedicated server. The central server keeps the data gathered, it generate statistics, and allow users to monitor their real-time status and track the evolution. Similarly, the system is able to generate alerts at defined values, and the prototype could be coupled with a remediation system of indoor air. This system controls the indoor ventilation if the measured parameter concentration exceeds the preset limits.

Easy to configure, simple to use, it offers the ability to access data from a mobile or desktop application are the benefits of this prototype. The system complexity guarantee years of ON-time functioning for accurate radon measurements.

In order to monitor and improve indoor air quality, 100 monitoring systems have been developed within the SMART_RAD_EN project. The system will be available free of charge to 100 dwellings in Cluj-Napoca, Bucharest, Timișoara, Sibiu and Iași.

*Keywords*: monitoring prototype, Indoor Air Quality, radon sensor.

# NEW CONCEPT FOR WATER SECURITY FOR CITIES, AS A MAJOR TOOL FOR WATER MANAGEMENT STRATEGIES FOR SUSTAINABLE REGIONS

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## ABSTRACT

Water security is taken to be defined by UN-Water, as the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water related disasters, and for preserving ecosystems in a climate of peace and political stability. (Source: http://www.unwater.org/topics/water-security/en/)

Urban areas are drivers of economic growth, prosperity and well-being. With the continuous worldwide urbanization process, there is a need to change the current course where urban citizens use more resources per capita than the planet can sustain in the long term. This forecast growth is an enormous opportunity to build and refurbish cities in ways that would turn them into drivers of sustainability. To do so, however, requires us to reconsider how we go about planning and plumbing our cities of the tomorrow. As an important new paradigm to work with includes the “Urban metabolism”: considering the total flow of energy, water and materials that goes through a city. On the basis of this, we can start how to “close the loops” of water, energy and materials.

Focusing on the water, we can easily group the planning and action to be taken under five main categories “re-duce”, “re-use”, “re-cover”, “re-cycle” and “re-plenish”. First reducing loss of water and increasing water efficiency is a major agenda for many cities around the world. Especially, for those urban areas that are located in water stressed areas, re-using water is increasingly feasible with new technologies now available. Then recovering energy, nutrients and other materials from waste water is becoming more and more economically viable and environmentally desirable. Those materials can be recycled and used in fertilizers, plastic appliances and become part of supplying materials to industries and farmers alike. Finally, the water management in our cities of the future focuses on replenishing the environment within and around cities. Restoring watersheds, lakes and ground water reserves all will be part of creating the urban water transitions in the 21$^{st}$ century.

The goal is to provide water security for cities by embracing a city planning agenda for a “regenerative city” which enables to better plan for the healthy, live able, risk-resilient city. This agenda goes beyond water and addresses all urban disciplines, it recognize how water actually shapes urban landscapes both because of natural water ways, storm and flood management, but also because regeneration urban water services are only fully implementable if integrated in urban landscapes at the building, district and metro scales.

There are many stakeholders involved to develop working together for concept implementation with many key focus areas to spell out the objectives that need to be achieved in the upcoming period to enable the regenerative city.

# COMPREHENSIVE ASSESSMENT OF MUNICIPAL SOLID WASTE MANAGEMENT LAND-USE PLANNING IN ROMANIA

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## ABSTRACT

In the last decades, the linear 'take-make-use-dispose' economy approach has been used, as a flexible and cushy system with production of low-priced materials and energy, a model that has reach-up to its end, due to its many environmental challenges: the resource depletion, waste generation and emissions. In the light of the above mention, in 2015 the European Commission proposed a set of recommendations on the current waste legislations linked with Circular Economy (CE). The official aim is "to stimulate Europe's transition towards a CE from production and consumption to waste management and the market for secondary raw materials" (CE strategy, 2016). Starting from the above mention, the aim of the study is to present the current Municipal Solid Waste Management (MSWM) in Romania and land-use planning, by assessing its implementation towards the CE strategy, considering the present and forecasting the future MSWM. In order to evaluate the current and future Romanian situation of the MSWM and its land-use, several parameters are taking into account such as: current distribution of MSW generation, legislation, the MSW available treatment options on the Romanian market, the selective collection rate and the perspectives towards MSWM transition path to CE strategy. In this context, according on the latest data provided by Eurostat, the amount of waste generated in the EU-28 decreased by about 6% over the past 10 years, with a rapid decrease in the last years, reaching a value of 240 836 $ktone_{MSW}$ generated in 2014. In 2014, in Romania, the MSW generated decreased with approximately 39% respect to 2005, by maintaining a relatively constant rate, in the last years of about 5000 $ktone_{MSW}$ generated / year. By analyzing the evolution of MSW generation in Romania, in the last four years, this decline may be associated with the start of the economic crisis in 2008, which led to a change in consumer behavior, to which are added the urgent implementation measures on waste management at national and EU level and the technologies maturity for energy production and use.

*Keywords*: circular economy, land-use planning, municipal solid waste, waste recovery.

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# A SWOT ANALYSIS ON THE EFFECTS OF HEAVY METAL CONTAMINATED WASTEWATER USE IN IRRIGATION OF VEGETABLE CROPS

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## ABSTRACT

Effective use of farmland search more efficiently methods of cultivation of vegetables and irrigation with domestic and industrial wastewater has found a solution to the problem of water reserves needed for crops. Irrigation is a great process in conditions in which the groundwater level from certain areas are not close to the surface of the soil. But besides well-known beneficial effects, irrigation can have harmful effects due to water quality. Pollution with heavy metals from wastewater lead to soil contamination and to the accumulation of these ions in the edible parts of vegetables of economic interest. Recent literature confirms that irrigation of agricultural land with domestic and industrial wastewater can play an important role in agriculture. To understand the beneficial and harmful effects of using wastewater in vegetables crop irrigation a SWOT analysis was performed. The purpose of this study is to produce a synthesis of the effects on irrigated vegetables with domestic and industrial wastewater, to analyze the strengths and weaknesses of the irrigation process as well as possible threats to cultivated plants or opportunities for developing this practice worldwide. The irrigation of agricultural land with domestic and industrial wastewater resulting in seasonal variation in soil water availability and can improve the nutrient levels and yields of crops generating better livelihoods through the possibility to cultivate high value crops near the cities. However domestic and industrial wastewater are responsible for environmental pollution, recovery treatments are usually made through biological processes eliminating biodegradable materials but the heavy metals present in the wastewater used for irrigation tend to accumulate in soils and cultivated vegetables. Water becomes a rare resource in terms of quantity and quality therefore it is a huge opportunity to use of long-term wastewater to improve and increase productivity for people's livelihoods in urban and peri-urban areas where freshwaters are rare.

*Keywords*: SWOT analysis, heavy metal, wastewater use in irrigation

# INDOOR AIR QUALITY ASSESMENT IN A CLASSROOM USING A HEAT RECOVERY VENTILATION UNIT

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## ABSTRACT

The present study reports on the analysis of a heat recovery ventilation unit inside a high school classroom. The analysis consists of measurement of Radon and $CO_2$ level during one week. The measurement points were made in the middle of the course classroom at a height of about 60 cm (at the bottom of the desk). Recordings were made for 5 consecutive days of a normal 1-hour workout along with one active Radon detectors – RADON SCOUT SARAD. The ventilation system has a geometric form of a parallelepiped, a cabinet located behind the class. The outer metal casing is covered with a wooden material in the color of the furniture in the classroom (in order to remove as much as possible the appearance of a foreign object in the room). Its outer geometric dimensions are: 2000 mm in height, 800 mm in width, 660 mm in depth. The dirty air (from the room) is aspirated to the upper side, and the freshly treated and filtered air is introduced at the top in the corner opposite to the sucking of the broken air.Its main components are: insulated metallic outer enclosure, integrated EC inlet and outlet centrifugal fan, plaster reclaimer, electrical heating batteries, air filters (G4 on the room air outlet and F7 on the fresh air introduced into the room), noise attenuators (both on the exhaust air circuit and on the fresh air circuit), temperature sensors, electronic plate control panel, suction grille, input grid, level sensor condensation and electrical resistance for evaporation, anti-purpose flaps type (to avoid air penetration when the unit is switched off / stand-by). To ensure a CO2 level according to the rules, it is necessary to introduce fresh air and evacuate the vicious depending on the amount of CO2 generated. This ventilation system has automatic control of fan speeds depending on the CO2 level.
**Results:** The Radon measurements average value for the sample week is 103 $Bq/m^3$ and the maxium limit of $CO_2$ is 1200 ppm. All these results are very good.


*Figure 1* ***A*** *3D Model of the classroom* ***B****.Heat recovery ventilation unit photo* ***C****.Radon measurements*

# STUDY OF VARIATION FOR THE GREENHOUSE GAS CONCENTRATIONS IN BUCHAREST'S SUBURBAN AREA

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## ABSTRACT

A major concern both in scientific and political terms is climate changes. The main cause of the global warming trend is the intensification of the greenhouse effect due to the increase of the greenhouse gas concentrations in the atmosphere as a result of emissions resulted from anthropogenic activities. The increased greenhouse gas concentrations contribute to climate changes by capturing excessive heat in the atmosphere and destroying the stratospheric ozone layer. In this context, this paper presents the results of a measurement campaign carried out to study the weekly variation of the main greenhouse gases in the atmosphere and some ozone precursors. The campaign took place in the second week of July 2017, in the suburban area of Bucharest, namely the town of Magurele. There were performed *in situ* measurements of CO2, CH4, CO and NO2 concentrations using Picarro greenhouse gas analyzer, respectively, Optical absorbtion CAPS (Cavity attenuated phase-shift spectroscopy technique) NO2 analyzer. The results of the measurements were compared with the data recorded in the Bucharest stations of the National Air Quality Monitoring Network, similar as location, for which measurements were available. Good Pearson's correlations for both CO and NO2 were obtained.

*Keywords*: measurements, greenhouse gases, CO2, CH4, CO, NO2

# ASSESSMENT OF NUTRIENTS LEVEL IN AGRICULTURAL GREENHOUSE SOIL

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## ABSTRACT

Generally, the soil quality is an indicator for environmental quality, food security and economic viability. The current study is focused on the assessment of nutrients content in greenhouse soils used for the cultivation of different vegetables (onion, cucumber, tomatoes, lettuce, eggplant, peppers) which are distributed in the local markets from Botoşani County (NE of Romania). The main objectives of the present study were: (1) to analyze the anions (Cl-, Br-, NO2-, NO3-, PO43-, SO42-) and cations (Na+, NH4+, K+, Mg2+, Ca2+) concentration in soil samples; (2) to evaluate the variation of nutrients content with the soil depth; and (3) to assess the seasonal fluctuations of nutrients content in soil.

Soil samples were collected from a greenhouse, located in Botoşani County (NE of Romania), during four campaigns (July 2016, October 2016, January 2017, and April 2017). A control soil sample was also collected from an area with similar geological features. The ions content was analyzed by ion chromatography using an IC system Dionex 1500.

The ions content was dominated by the presence of NO3-, which reached a level of 820.17 mg/kg in the top soil (0 – 20 cm) sampled during October 2016. Sulfate ions had a relatively low content (up to375.5 mg/kg) being below the alert threshold for sensitive soils (2000 mg/kg), value imposed by national legislation (Ministry Order No. 756 of 3 November 1997). In the analyzed soil samples, the level of major nutrients ranged between 21.6–287.3 mg/kg (Cl-), 12.1 – 281.6 mg/kg (K+), 19 – 280 mg/kg (Na+), 22.8 – 153.8 (Ca2+), 10.2 – 39.9 mg/kg (PO43-), 21.3 – 75.2 mg/kg (Mg2+), and 0.18 – 9.3 mg/kg (NO2-).

Comparing the control sample with greenhouse soil it was observed that in greenhouse soil the nutrients concentrations are higher. The obtain results showed that the content of nutrients in the studied agricultural soil decreased with the sampling depth. In terms of seasonal fluctuation, it has been observed that the highest ions concentrations were generally registered during summer time (July 2016).

*Keywords*: Soil, nutrients in soil, anions and cations.

# IDENTIFICATION OF SCHOOL-AGED PEDESTRIAN TRAFFIC VULNERABLE AREA, UNSAFE BUS STOPS AND UNSAFE HOURLY INTERVALS. CASE STUDY: BUCHAREST CITY, ROMANIA

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## ABSTRACT

Pedestrian road accidents can be seen as events causing loss of life or body injury. In the study hereby we want to identify the areas prone to pedestrian accidents of school age in order to assist local authorities in finding and implementing measures to prevent and reduce them. Vulnerable areas were established by calculating the severity index, based on the number of fatal, serious and easy injuries in 2011-2016 in Bucharest. In addition to vulnerable areas, unsafe bus stops and hourly intervals were identified among school pedestrians. The results of the study showed that vulnerable areas are concentrated only in Districts 2 and 4 of Bucharest, in areas with high pedestrian and road traffic. Time peaks identified with a high number of road accidents correspond to afternoon hours, when students return from school and parents go shopping. Unsafe bus stations have been identified near Tineretului Park, in the proximity of Resita Square and Ferdinand Boulevard. Knowing vulnerable areas, bus stops and insecure hourly intervals among school pedestrians can help pupils and parents become more vigilant in these areas and times.

*Keywords*: car crashes, school-age pedestrian, severity index, bus stops, rush hour, Bucharest

# EFFECTS OF HEAVY METALS CONTAINED IN FLOTATION TAILINGS FROM BOZANTA TAILINGS POND ON PLANTS USED IN REVEGETATION

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## ABSTRACT

As a result of the processing of precious and base metal ores from Baia Mare mining area, containing Au, Ag, Cu, Pb and Zn, large amounts of flotation tailings resulted, which were deposited in Bozânta tailings pond, located between villages Săsar and Bozânta Mare villages, 4 km west of Baia Mare.
The Bozânta tailings management facility functioned between 1976 and 2007. Due to the presence of minerals containing metal sulphides (mainly pyrite), the acid rock drainage (ARD) has become very active, catalysed by iron- and sulphur-oxidizing bacteria, which naturally occur in these sites. The reduction of the pond extension as a result of the evaporation, combined with the increase of the beach area and the absence of any protection at the embankment crest, resulted in the fine tailings drifting at considerable distance. They often end up in neighbouring settlements, especially in the two mentioned villages, as a result of prevailing winds in the NE-SW direction.
The purpose of the research was to test the resistance of some plant species (Sinapis alba – white mustard, Trifolium pratense – red clover and Lolium perenne – ray grass) to the conditions generated by the tailings on the surface of the depot, to create a vegetation cover with a role in diminishing tailings discharges in the adjacent areas.
There were tested the effects of the industrial eluate (acid mine water, pH 4.3), obtained from the tailings pond, over seed germination parameters: germinative factor (GF), germinative energy (GE) and germination index (GI). The results of the tests pointed out that the least affected was white mustard: GF – 95.3%; the differences in the values obtained in the control samples and the GE test – 5.3%; the results for GI – 99.3%, confirm that the mustard seeds were the least influenced by the industrial eluate, followed by ray grass and red clover. In the tests for plant growth on the tailings pond, 5 working variants were used: a) vegetable soil (S); b) flotation tailings (T); c) flotation tailings + vegetable soil (T+S) mixtures; d) flotation tailings + organo-zeolite (T+O) mixtures; e) flotation tailings + organo-zeolite + vegetable soil (T+O+S) mixtures. It is recommended to use the T+O+S mixture on the pond surface and sowing with S. alba and T. pratense. For both species, double seed sowing is recommended.

*Keywords*: tailings pond, flotation tailing, ARD, heavy metals, revegetation

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# AGRICULTURAL WATER SCENARIOS IN SOUTH AFRICA – 2030

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## ABSTRACT

The challenges of feeding South Africa's growing population in a climate-altered, resource-constrained future are substantial. The availability of freshwater presents one of the greatest risks to South Africa and the global economy at large. Demand for water in South Africa is projected to increase with economic growth, increased urbanisation, higher standards of living, and population growth. Climate change impacts could exacerbate existing water-related challenges and create new ones through increased rainfall variability including more frequent extreme weather events (droughts and floods), changing rainfall seasonality and overall warming leading to greater surface water losses to the atmosphere. This would affect a wide range of economic sectors and livelihoods, impact on the development of infrastructure and catchment management, and demand management into the future. Poor management of water resources threaten the resource base on which agriculture depends, therefore, there is a need to conserve water by creating and managing alternative water sources through the development of scenarios for future agricultural water use and other benefits.

This project aims at suggesting and developing scenarios for future agricultural water management despite natural and unnatural hazards, which pose as challenges to this development. These aims will be addressed through key objectives such as, identification of scenario driving forces and variables and the effects of these driving forces on scenario building for future agricultural water management. Game theory will be applied in the development of a decision support tool for scenario development.

The scenarios will provide stakeholders and policy-makers in South Africa's water sector with valuable insights to strengthen decision-making and to counter undesirable trajectories of change in order to achieve food security, continued relevance of agricultural sector and agricultural development in South Africa.

# DISASTER RISK REDUCTION THROUGH CLIMATE CHANGE ADAPTATION PROGRAMS: THE CASE OF SOUTH AFRICA

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South Africa (SA) introduced significant actions to respond to climate change risks and impacts. Several projects and programs are driven by the SA climate change policy. Monitoring and evaluation (M&E) is an ongoing process. The SA M&E addresses measurement, reporting and verification. It also evaluates climate change impacts and effectives of climate change responses in SA.
SA identified 13 investment areas and flagship programs that are designed focus points for large-scale transition to a lower carbon economy and a more climate resilient SA. The program put government on the forefront of the use of new and green technology and facilitates the diffusion of these technologies through private sector and society as a whole. The flagship programs are:

I. Climate Change Response public Works Flagship Program
II. Water Conservation and Demand Management Flagship Program
III. Renewable Energy Flagship Program
IV. Energy Efficiency and Energy Demand Management Flagship Program
V. Transport Flagship Program
VI. Waste Management Flagship Program
VII. Carbon Capture and Sequestration Flagship Program
VIII. Long-term adaptation Scenarios Flagship Research Program (DEA)
IX. Agriculture, Food Systems and Food security Flagship program
X. Low Carbon, Climate Resilient Built Environment, communities and Settlements
XI. Flagship Program
XII. Disaster Risk Reduction and Management
XIII. Health
XIV. Low Carbon Climate Resilient Built Environment, Communities and Settlements

*Keywords*: climate change, climate resilience, disaster risk reduction.

# CLEAN TECHNOLOGY FOR REDUCTION OF $NO_X$ EMISSION

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## ABSTRACT

Implementation of cleaner technologies is foreseen as one of the solutions for the existing environmental problems including the reduction of nitrogen oxides (NOx : NO and $NO_2$) and $N_2O$ emissions. Improvements in reduction of the nitrogen oxides emissions can be accomplished by development of efficient catalysts for the decompotion of NOx in the technological processes.
In this work classical type of vanadium oxide-titania ($V_2O_5/TiO_2$) and new type iron-zeolite (Fe-ZSM-5) catalysts were studied and their acitivities were compared in the decomposition reaction of NOx during Selective Catalytic Reduction (SCR) where ammonia ($NH_3$) was used as reduction agent in the chemical process.
The aim of the work was to study the physical-chemical, morphological properties of $V_2O_5/TiO_2$ and Fe-ZSM-5 catalysts by BET, XRD methods as well as the effect of reaction conditions (such as reaction temperature range, $NH_3$/NOx feed, reactant amount) towards catalytic activity enhancement.
Note that both catalysts are not recommended to be used below 230°C. At low temperature the ammonia reacts with $NO_2$ gas producing explosive ammonium nitrate $NH_4NO_3$ and ammonia nitrite $NH_4NO_2$. $V_2O_5/TiO_2$ catalyst has high activity in temperature range of 250-320°C. The maximum 80-82 % NOx conversion was reached at $NH_3$/NOx 1.2 feed. The Fe-ZSM-5 has higher NOx conversion of 97-98 % at 290-320°C at $NH_3$ /NOx 1.6 feed. At the highest $NH_3$ /NOx = 2.2 feed the conversion was constantly near to 98% in the studied temperature range. It is advisable to avoid feed ratios much greater than 1 since it results in significant $NH_3$ slip (unconverted $NH_3$).

*Keywords:* air pollution control, deNox SCR, V2O5/TiO2 and Fe-ZSM-5 catalysts

# MULTIWALLED CARBON NANOTUBES FOR DEPOLLUTION OF WATER

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## ABSTRACT

The use of fossil fuels are still on increase and as an outcome of the wide use of gasoline, gas oil and petroleum derivatives pollution in surface waters, oceans, land, etc. occurs. This pollution stems from leakages, accidents, mismanagement, etc. Hydrocarbon degradation is slow, especially under the surface and it takes place through microbiological way. This fact suggests that oil products have a considerable environmental persistence which is to be eliminated. Therefore effective measures are needed to be accomplished in order to remove the oil pollution from waters and soils.

The objective of the paper was to elaborate a new type of adsorbents for the removal of hydrocarbons from surface waters. The single and multiwalled carbon nanotubes got a high interest for the removal of hydrocarbons and petroleum derivatives due to their high adsorption capacity and hydrophobic properties. The functionalization of the multiwalled carbon nanotubes was accomplished with the aim to increase the hydrocarbon sorption capacity of the carbon nanotubes. Microemulsion technique was used to modify the surface physical-chemistry properties of the modified multiwalled carbon nanotubes. The changes in the surface properties were followed by analytical techniques including BET, TG, XRD, Raman-spectroscopy. The results of the surface chemistry studies were interrelated with the hydrocarbon removal efficiency measured by Gas chromatography.

*Keywords:* Watertreatment, oil removal, Multiwalled Carbon Nanotubes adsorbens, GC

# RENEWABLE ENERGY AND SUSTAINABLE DEVELOPMENT

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## ABSTRACT

The technological solutions to global environmental problems requires effective measures and actions for sustainable development and to improve the quality of life. The renewable energy sources must be considered to replace the fossil fuels and to protect the environment. There is a strong interaction between renewable energy and sustainable development. The present environmental impacts of energy generation (acid precipitation, stratospheric ozone depletion, the greenhouse effect, and danger of nuclear disasters) are to be eliminated. Renewable technologies are considered as clean energy sources and the use of these resources minimize environmental impacts, produce no secondary wastes and are sustainable from the point of view of economic and social needs. Sun is the source of all energies. The utilization of the biomass, wind energy and ocean energy are also to be considered.

Multi-Criteria Decision Making (MCDM) techniques can be expediently used in sustainable energy management. The techniques provide solutions to the problems including the expectations of the society and objectives and goals. Several methods based on weighted averages, priority setting, outranking, fuzzy principles and their combinations are used for energy planning decisions.

The paper deals with the technological assessment of the different renewable energies and the future prospects of the use of green and renewable energy forms in compliance with the environmental expectations and regulations.

*Keywords*: Multi-Criteria Decision Making techniques, Renewable Energy, Sustainable Development

# EXPLOSION RISK MANAGEMENT WAYS OF DIFFERENT APPROACHES

LAJOS KIRALY

## ABSTRACT

Today insde the EU border all legal requreiments are defined the real requirements of explosion protection by laws and standards. The main approach is to ensure the real way of the compliance is to use proper slutions what are defined and enforced. The main scope of the article is to highlight the followings:
- legistlation analisys,
- standard requirments,
- new approaches,
- modification requirments.
The most imortant message of the aboves are to share the modification of Fire State Law and practice for Hungary and its practice document to ensure proper practices and guidelines.

*Keywords*: Explosion protection

# CRISIS COMMUNICATION ASPECTS CONNECTED TO POST-DISASTER-RECOVERY

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## ABSTRACT

This paper was prepared related to my PhD study, which studies the issues of evaluation methods for post-flood-disaster-recovery process and it aims to examine the crisis communication aspects connected to public confidence which was analysed in my previous study. The effects of media and communication on public opinion are indisputable. Starting from this statement and my previous experiences it was necessary to investigate the relevant parts of communication activities in the Hungarian responsible post-disaster-recovery coordination and management organisation (National Directorate General for Disaster Management, Ministry of the Interior) and public service media represented by Hungarian Telegraphic Office with interviewing their competent experts (empirical study). Besides the general conceptualization and exploration of questions it was important to gain information about whether did the above-mentioned organisations investigate their communication activities influences on the public, more specific what kind of feedbacks might be resulted in the disaster-prone areas (directly and indirectly affected population, as well) from their crisis communication activities. This article describes a short significant literature review about the topic and summarised results from the experts interviews.

*Keywords:* mitigation communication, public service media, empirical study

# COMPARISON OF TOTAL PRECIPITABLE WATER OVER MAGURELE

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## ABSTRACT

Water vapor is a key element of the atmosphere, since it is the strongest natural greenhouse gas. It's accurate knowledge is essential for a number of meteorological and climate applications, such as radiative transfer modelling or weather forecasting, among others. The majority of these applications use the verticaly integrated amount of water vapor, or total precipitable water (TPW) equivalent amount. Traditionally, the measurements of this quantity is derived from radiosonde data, however it can be estimated from other methodologies, employing remote sensing measurements of the atmospheric radiation, such as microwave radiometers or sun photometers.

In this study, we present a comparison of the TPW obtained over Magurele with a Hat-Pro microwave radiometer and a Cimel sun photometer, with the TPW from the radiosondes flown at the nearby Baneasa airport (~30 km away), over the period 2009 – 2017. The overall agreement with these three datasets is very good, with the correlation coefficient being higher than 0.95 between all datasets. More specific, the square root of the Pearson correlation coefficient between the TPW from the radiosondes and the radiometer is ~0.97, with a mean difference of ~ 0.17 mm (1.8%), between the radiosondes and the Cimel sun photometer ~0.95, with mean difference ~ -0.13 mm (-0.6%) and between the collocated radiometer and Cimel ~0.98, with their respective difference being ~ -0.77 mm (-3.3%).

*Keywords*: Total precipitable water, microwave radiometer, radiosondes, cimel sun-photometer

# NATECH MULTI-RISK ASSESSMENT FOR SEVESO TYPE SITES

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## ABSTRACT

This research provides an overview of the state of the art in Natech risk assessment and management, focusing on the possible Natech events in Moldova region, Romania. The article describes Natech events assessment, starting from natural events such as floods and earthquakes with their effects on the SEVESO plants, analyzes current and potential safeguards for Natech risk management, and discusses future strategies for national Natech multi-risk reduction.

*Keywords*: Natech, multi-risk, Seveso, Vrancea

# ASSESSMENT OF AIRBORNE PATICULATE MATTER IN URBAN ATMOSPHERE OF CLUJ-NAPOCA, ROMANIA

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## ABSTRACT

One of the critical issues of urban air quality worldwide is the frequent incidence of high levels of airborne particulate matter (PM), as the association between various respiratory and cardiovascular diseases and exposure to high PM levels is demonstrated. Total suspended particulates (TSP) and PM with particle size of 1 μm (PM1), 2.5 μm (PM2.5), 4 μm (PM4) and 10 μm (PM10) were measured by Aerocet 831 handheld particle monitor in 42 sampling points in residential, industrial, intense and low traffic flow areas from Cluj-Napoca city. The results showed high PM variability, PM10 values exceeding the daily limit (50 $\mu g/m^3$) and PM2.5 values exceeding the yearly limit (25 $\mu g/m^3$), in the majority of the sites. Generally, PM with diameter between 4-10 μm was the major fraction (37%), followed by PM1 (24%), PM1-2.5 (17%), and PM2.5-4 (11%) of TSP. Only 11% of the TSP had diameters above 10 μm. The distribution map of PM revealed that the maximum levels of PM10 and PM4 were found in the city centre, while the maximum level of PM1 and PM2.5 in the NW, both sites being situated near roads with intense traffic.

*Keywords*: airborne particulate matter, urban area, PM10, PM2.5, PM4, PM1

# LONG TERM ASSESSMENT OF BLACK CARBON IMPACT ON AIR QUALITY

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## ABSTRACT

Black carbon plays an important role in earth radiative budget mainly due to the direct absorption effect and represents the main important tracer for different combustion processes like biomass burning or fossil fuel combustion. Black carbon (BC) is almost inert and transportable on very long distances, the main physical process that is involved in particle aging being the coating while brown carbon associated with more organic compounds and wood burning is more susceptible to photochemical oxidations by oxidants present into the atmosphere.
In this study we analyzed long term measurements underlining the evolution of BC and dependencies of meteorological parameters and possible connection with seasonal dependent long-range transport. Different absorption properties in ultraviolet, visible and infrared of black carbon are exploited to separate the wood contribution and traffic from the total equivalent BC. The analyses were performed in an area influenced during cold season by residential heating and by agriculture and waste fires in hot season, and in addition by a constant traffic source (Bucharest ring road). An 7 wavelengths aethalometer was used together with Aerosol Chemical Speciation Monitor (ACSM) to properly separate the influence of traffic and wood burning. Specific markers for biomass burning like levoglucosan sugars were compared with source apportionment results for BC, to properly asses the contribution of wood burning or traffic to air quality.

*Keywords*: Black carbon, source apportionment, fossil fuel, wood burning

# A PRELIMINARY STUDY OF REAL-TIME MEASUREMENTS OF SECONDARY ORGANIC AEROSOL (SOA) FORMATION AND AGING FROM AMBIENT AIR IN A POTENTIAL AEROSOL MASS REACTOR (PAM) IN THE PARIS AREA

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## ABSTRACT

Secondary organic aerosols (SOA) represent up to 80-90% of the total organic aerosols (AO) under certain environments (Jimenez, 2009). Due to the various existing formation pathways (from gas-phase reactions of precursors to heterogeneous processes), which are not exhaustively described yet, the impact of SOA on the earth radiative budget and air quality cannot be fully evaluated. In this context, a growing number of studies in large environmental chambers or small oxidation flow reactors (OFR) focuses on the study of SOA formation processes from known precursor compounds or different emission sources.

The objective of this work was to evaluate the formation of SOA from ambient air within the highly oxidized conditions of a potential aerosol mass flow reactor (PAM) (Kang, 2007). The SOA formation from ambient air has been studied for several days at the SIRTA atmospheric research observatory, representing the suburban background air quality conditions of the Paris region (25 km SW of Paris). Different OH exposures, with and without addition of SO2 to generate seed particles, have been investigated. The aerosols have been chemically, and size characterized using on-line instrumentation (Aerosol Chemical Speciation Monitor, ACSM and Scanning Mobility Particle Sizer Spectrometer, SMPS) deriving the changes in the mass concentration, chemical composition, number concentration and size distributions for the different oxidant conditions. SOA formation was estimated through the comparison between the aged organic aerosol generated in the PAM and the organic particles measured in the ambient air.

Keywords: secondary organic aerosols; oxidation; potential aerosol mass flow reactor

# RESEARCH ON LOW AND HIGH FREQUENCY ELECTROMAGNETIC RADIATION IN ROMANIA

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## ABSTRACT

The rapid evolution of society and consequently of technology in the past decades brings with it a higher consumption of electricity and an extension of the electrical network and electrical installations. Energy production and consumption exert considerable environmental pressure, contribuiting to climate change and the deterioration of natural ecosystems and causing adverse health impacts. The need to keep pace with social evolution leads to the use of more electrical and electronic devices. All of these further lead to the environment being loaded with plenty of electromagnetic fields and electromagnetic radiation, including the resting places of people. Lack of in-depth studies on the non-thermal effects of electromagnetic fields on humans on lonng exposure makes the application of the principle of precaution to be strict necessity. This paper presents the results of electromagnetic radiation measurements in the public environment in several cities. Measurements were performed for both low and high frequencies. Measurement results show that in many places the legal norms are exceeded over long periods of time.

*Keywords*: electromagnetic fields, radiation, non-ionizing radiation, public environment, human exposure

# FOREST COVER EVOLUTION IN THE HÂRTIBACIU PLATEAU, SOUTH OF TRANSYLVANIA: A REVIEW OF MAPS FROM THE EIGHTEENTH CENTURY TO PRESENT DAY

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## ABSTRACT

Transylvania has undergone major political changes in the last three centuries, from the Austro-Hungarian Empire, to Romanian Kingdom, Two World Wars, communism, capitalism democracy and EU state member. Every political change had a specific influence on the land cover evolution in the area. The Hârtibaciu Plateau is a geomorphological unit in the south of The Transylvanian Basin. Mainly due to its rugged terrain and it is the most forested compartment of the Transylvania Depression. The aim of this study is to assess the evolution of forest cover from the eighteen century to present day in the Hârtibaciu Plateau. Five sets of historical maps from the 1770s, 1860s, 1890s, 1930s, and 1970s have been used for extracting forest cover data. The data was manually extracted in QGIS by using the digitizing tool. The data has been compared with present day forest cover (CORINE 2012). There is a discussion regarding the interpretation of what defines a forest in each map set. The data has been analysed with QGIS, GRASS GIS, and R Statistics. A slightly increase in forest cover has been observed in the last 250 years. However, no significance discrepancies have been detected in the evolution of the forest cover in relation to altitude, slope values, or political regime. Most of the forest cover for the studied area has been maintained in roughly the same areas over the last two and a half centuries, with few exceptions of several patches.

*Keywords*: forest evolution, old maps, land cover change, GIS, Transylvania

# CHARACTERIZATION OF NANOSIZED TIN DIOXIDE POWDERS

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## ABSTRACT

The paper presents two wet preparation methods (sol-gel and precipitation with urea) used to generate conducting and luminescent nano-powders as well as the results of the investigations on the effect of the preparation methods, the exposure of the powders to the laser radiation, the modification of the dopant type and the variation of thermal treatment conditions after powder preparation on particle size, morphology, chemical composition, electrical conductivity and photo luminescent characteristics. The methods used for nano powders characterization were: XRD, SEM, EDX, EIS and fluorescence analysis.

*Keywords*: SnO2 nanopowders doped with trivalent metal ions (Sb3+, In3+, REE3+), luminescent properties, electric conductivity.

# PERFORMANCE EVALUATION OF VRANCEA EARTHQUAKE EARLY WARNING SYSTEM

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## ABSTRACT

In the last years a lot of research was carried out all around the world in order to implement earthquake early warning systems, real time systems that will have a big potential to reduce the seismic risk. In Romania there is an operational early warning system that is able to send earthquake location and magnitude since 2013. The Early Warning System (EWS) is able to send alerts and notifications to Romanian emergency response authorities, emergency centers from ministries which have this task and also to critical nuclear infrastructures (nuclear research facilities, power plants and other similar activities). Romanian territory together with the neighbor countries Moldova, Ukraine and Bulgaria are periodically affected by the intermediate depth earthquakes originating from Vrancea area, earthquakes with depth ranging between 60 and 200 km. The seismicity of Romania is significantly affected by earthquakes produced by the Vrancea seismic source with intermediate depth events (3 shocks/century with magnitude Mw greater than 7.0). Rapid broadcast of alerts are now possible due to recent technical upgrades of seismic equipment and rapid communication together with recent researches on methodologies to rapidly estimate magnitude and location of earthquakes using only a few seconds of data after P wave detection. In order to rapidly locate and estimate magnitude are used a few seconds of strong motion acceleration data. In this paper we present the performance of the earthquake early warning system to rapidly locate and estimate magnitude for events occurring in the Vrancea area.

*Keywords:* Earthquake Early Warning System, Earthquake magnitude, Vrancea

# ORGANIC FARMING AND ITS ROLE IN SUSTAINABLE DEVELOPMENT

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## ABSTRACT

Intense exploitation of the soil, the use of chemicals in excess and increasing food demands, have as effect degrading of the environment. Following the industrial revolution in the second half of the 20th century, and the shift from traditional systems to modern farming systems, agricultural output has grown because of the widespread use of pesticides and chemical fertilizer. Besides the positive effects of industrial agriculture, the negative effects have a strong impact on the environment. The disadvantages of these farming systems are considered harmful to both human health and the environment.
Major climate changes observed in recent decades have caused significant negative changes in agriculture. The emergence of organic farming, a component part of sustainable agriculture, has been the result of observing the multiple disadvantages of industrial agriculture. Food requirements of the Earth can not be sustained and covered by organic farming, but in line with industrial agriculture, can provide a more friendly environment for future generations. This paper aims to present the benefic agricultural practices for environment in sight of sustainable development.

*Keywords*: Organic farming, exploitation, sustainable development, soil

# KEEP THEM ENGAGED: ROMANIAN COUNTY INSPECTORATES FOR EMERGENCY SITUATIONS FACEBOOK USAGE FOR DISASTER RISK COMMUNICATION AND BEYOND

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## ABSTRACT

Nowadays, the use of social media by public institutions involved in disaster management starts to become common practice. But, despite scientific interest for the effect of social media on disaster risk and crisis communication, data exploring emergency management agencies' round-the-clock Facebook usage and the impact of their content and media choices on stakeholder engagement is limited. This study set out to investigate Romanian local emergency agencies' Facebook usage patterns and stakeholders' engagement with their content. Data is comprised of 7810 messages posted between the 1st January and 25th October 2017 by 32 County Inspectorates for Emergency Situations. First, using content analysis techniques, the topics of the posts were summarized to illustrate how these agencies use Facebook. Second, stakeholders' engagement was investigated using social marketing techniques. Third, messages related to natural hazards were analysed more in-depth to reveal disaster risk communication patterns. Results suggest that Romanian emergency agencies mainly promote transparency and their institutional image on Facebook. Stakeholders most likely engage with brand-oriented post, especially if these also offered rich multimedia feature. Meanwhile, stakeholders are less likely to interact with messages about natural hazards, particularly if they incorporate educational content. These observations suggest that, while at the moment Romanian local emergency management agencies take advantage of Facebook to create and maintain relationships with their stakeholders, they bypass opportunities to implement communication strategies for effective disaster risk reduction.

*Keywords*: Facebook; engagement; emergency management agencies; disaster risk communication; media and content type.

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# REFLEXIONS REGARDING SOCIAL WORK CONTRIBUTIONS TO RECOVERY FROM DISASTERS CAUSED BY FLOODING IN ROMANIA

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## ABSTRACT

In the 21st century, extreme phenomena continue to produce negative effects on the social system, with life-threatening effects. I argue that social workers, as professionals dedicated to assist persons and communities to identify solutions to increase the quality of life and well-being for all, have the tools to contribute to disaster risk reduction (DRR). Purpose: I reflect on the social workerâ€™s role in the teams who participate in DRR. The rather low public awareness regarding social work in Romania doesnâ€™t make justice to the actual contribution to reducing risks. My presentation aims at (a) promoting the â€invisibleâ€™ work done in the local communities, (b) highlighting the potential of the profession to contribute to DRR and (c) strengthening the importance of integrated approaches to DRR. Methodology: The oral presentation is based on 12 in depth interviews with professionals who are active in non-governmental organisations (NGO) and public institutions in Romania in disaster risk reduction. Overall, six interviews were conducted with social workers: three structured interviews with specialists employed/contracted at local level in rural areas, and three with social workers active in NGOs in different cities. The remaining six interviews with non-social workers express opinions towards the importance of social workers in their teams. Results and/or practice implications: The disaster risk reduction caused by flooding is mainly addressed through structural measures, like building dams, gabion walling, river cleaning, and other measures taken at local and/or regional level and is less focused on reducing individualsâ€™ vulnerability and to increase resilience. Social work in emergency situations is recognised in regulations, but within the implementation, services are provided more by the NGOs than by the public institutions. Main research findings/conclusions: At the moment, despite the rather high frequency of disasters in Romania, in a system oriented towards emergency situations, the role of the social worker is rather marginal. However, through training and knowledge regarding the vulnerability of the community, the social worker is a valuable resource and can contribute to sustainable development.

*Keywords:* Social worker in disasters, green social work, sustainable development and social work, disaster risk reduction

# ASSESSMENT OF WATER QUALITY USING WATER QUALITY INDEX (WQI) METHOD: CASE STUDY OF THE COLIBITA RESERVOIR (ROMANIA)

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## ABSTRACT

Colibita Lake is a reservoir on Bistrita Ardeleana River part of Somes-Tisa Watershed in Calimani (Bistrita-Nasaud County) with the following features: 270 ha, 13 km length, 65 min.$m^3$ volume. The water body itself has a mean volume of 90 million $m^3$ and a maximum depth (at the foot of the dam) of 85 meters. The water surface lies at a medium absolute altitude of 785 m and covers 3.14 $km^3$, being 5.5 km long and 1 km wide, and it is used for energy production and source of water supply for Bistrita city and surrounding areas.
This study is conducted to analyse the seasonal water quality status of the Colibita reservoir in terms of Water Quality Index (WQI). Water Quality Index (WQI) is a dimensionless number that combines multiple water-quality factors into a single parameter. The method consists in the computation of the WQI on the basis of the physical-chemical and biological quality.
The study is based on the parameters that were registered at the Colibita Lake monitoring stations of the Somes–Tisa Water Division in the period 2016-2017. The results obtained for the WQI indicate a good water quality.
The present study highlights the importance of applying a water quality index that reflects the collective influence of all different criteria responsible for water pollution of any water body and which allows interpretation of data based on monitoring.

*Key words:* water quality, water quality index (WQI), Colibita Lake; reservoir

# KEY FACTORS IN THE EMERGENCY MANAGEMENT SYSTEM

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## ABSTRACT

In this paper, it is proposed to study a method for assessing the systemic management of the emergency in case of nuclear accidents. The chosen analysis method is a systemic one that deals with the interaction of component parts for defining sensitive elements of weak links that require more attention to improve them. For this, a brief description of the National Emergency Situation Management System is needed to define it as a complex system. The management of the emergency situation, considered as a complex system, is considered to be a system that manages the emergency response at the level of the operator (on-site), a system that manages the response at the local, county and national (off- site) and a variable system that defines hypothetical emergency situations that would trigger the other two systems. This will define as the matrix the on-site and off-site emergency management systems and as vector the variable system that defines the hypothetical emergency situations for which the mathematical apparatus specific to the operational research applies. A system can be described using system-specific methods. One of the components of this approach is the description of the structural and interaction parts of the matrix management system. Using system theory by using matrix calculations leads to quick, repeatable and verifiable results with many advantages over multi-criteria decisions and expert type analyses. In order to identify the key factors in the management system, in this study we will use the analysis method that deals with component interaction at all levels of the management system to define sensitive elements, weak links that require more attention to improve them. The proposed study defines the structure matrix for the two types of management system and the input that is a disturbing vector for the variable system. The structure matrix for on-site level is defined by the following: - the emergency response organization, - the elements of the emergency response plan on site. The input for matrix computation at on-site level is defined as the most important events that can be classified as emergency situations at the site of the nuclear installation. The next level, off-site, the matrix representing the off-site management system is described by the following: main components, resources, off-site response plan.

*Keywords*: Key factors

# MANAGEMENT OF WASTEWATER TREATMENT SLUDGE – ENVIRONMENT PROTECTION ISSUES

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## ABSTRACT

Research has been carried out on the use of dehydrated and stabilized sludge at Chişinău Biological Treatment Plant (CBTP) as an organic fertilizer. The physical, chemical and microbiological composition of the sludge from CBTP was evaluated, the optimal sludge doses as soil amendatory under different agricultural crops were determined, the soil pretability for the application of the sludge, generated in the domestic wastewater treatment, was evaluated. Methodologically, the works were carried out in accordance with the requirements of Directive 86/278 / EEC on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture. It has been established that the sludge accumulated in (CBTP) contains sufficient amounts of organic matter and macronutrients (NPK) necessary for the development of plants, while the heavy metal content does not exceed the maximum admissible concentrations for sludge stipulated in the national and European regulations. The experiments carried out during the years 2014-2016 have demonstrated the effectiveness of the use of dehydrated and stabilized sludge from CBTP as a fertilizer under different agricultural crops. Investigations have been carried out on the possibility of composting fresh sludge from wastewater treatment plants with various agricultural waste. The controlled composting technology of sludge with poultry manure contains original elements for the intensification of the composting process by activating the thermophile micro-flora, so that a fertilizer with high physic-chemical qualities and free from helminths and pathogenic microorganisms is obtained. Conducting composting in a controlled way allows the capture of ammonia, carbon dioxide, thermal energy and their use in greenhouses, which also diminishes the polluting impact on the environment (Fig.1).

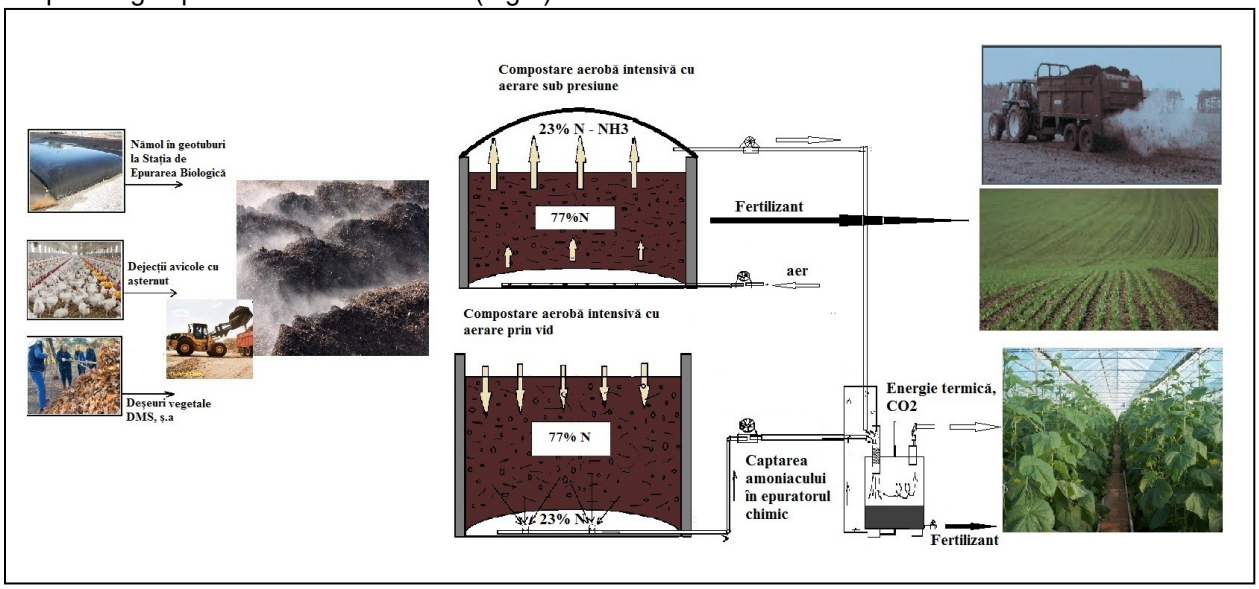


Fig. 1. Processes of composting sewage sludge from the wastewater treatment plants with other biodegradable waste

The proposed technology for implementation has the following advantages:

• Average composting time is 2-3 times lower;

• Combined composting of sludge and poultry manure with litter reduces the risk of soil pollution with heavy metals;
• Improves the conditions of transportation and introduction of the fertilizer into the soil;
• It is a concentrated organic, odourless and free of pathogenic agents fertilizer capable to improve the physico-chemical and biological properties of the soil.
• Conducting the composting in a steered mode allows the capture of ammonia, carbon dioxide, thermal energy and their use in greenhouses, also diminishing the environmental pollution.

*Keywords*: fertilizer, heavy metals, sludge, waste

# MONITORING AND CORRELATION OF RADIO WAVES SUBIONOSPHERIC PROPAGATION ANOMALIES IN LOW (LF) AND VERY LOW FREQUENCY (VLF) DOMAIN WITH SEISMIC ACTIVITY AND SPATIAL WEATHER

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## ABSTRACT

The general idea behind the paper is the concept of a complex and multidisciplinary research, which seeks a fresh perspective on geophysical phenomena associated with earthquakes preparation periods obtained by simultaneous processing of records obtained from the International Network for Frontier Research on Earthquake Precursors (INFREP). This initiative is an attempt to investigate ionospheric perturbations over Europe related to the European earthquakes, using cross-correlated monitoring and analysis.

There have been pursued both the propagation characteristics in the ionosphere of very low and low frequencies (VLF / LF) radio waves (available via the INFREP network - http://lablum.fisica.uniba.it/). The project investigated interactions in the Earth-Space coupled system in correlation with earthquakes in Europe, using ionosphere monitoring systems existing in Romania and Europe - INFREP VLF / LF receivers. The Romania receivers are installed in Eforie North, Constanta County and Barlad, Vaslui County.

The primary objective was to study seismo ionospheric phenomena and identify peculiarities of their manifestation in correlation with earthquakes. Using experimental observations and advanced mathematical processing, the paper attempts to identify the associated ionospheric signatures of earthquakes. The paper proposes an inter-linked investigation of phenomena that occur in the lithosphere-atmosphere-ionosphere coupled system in order to highlight the abnormal behavior observed in the propagation characteristics of radio waves at very low frequencies (VLF: 10KHz-50KHz) and low (LF: 100kHz-500kHz) and correlation with seismicity and spatial weather (solar explosions, magnetic storms)

*Keywords*: ionospheric propagation, seismic activity, earthquakes precursors

# REGARDING THE ENERGETICAL EFFICIENCY OF THE ROMANIAN HOME AMID TRANSITION FROM TRADITIONAL TO ECOLOGICAL HOME

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## ABSTRACT

Our work is focused on the home – the sanctuary of life and the protection against the worlds harshest abrasions. The Romanian people have a special relationship with their home, being amongst the biggest markets for home improvement and home ownership in Europe. A research regarding the energy efficiency and energetical consumption goals of the Romanian home being a subject that naturally relates to the heart of this folk. After studying and defining the ecological house, the next logical step was to acknowledge the actual development of the Romanian home. With over 30% of the energy consumption being located in the housing sector, the importance of studying the actual level, the optimum level and the legal level of consumption cannot be ignored.
We analyzed the statistics regarding home energy consumption, the goals of the 2016-2030 Romanian strategy, the marketing standards and the ecological definitions of the ideal home in order to provide both a snapshot of what is and a perspective of what the future might hold for the peaceful and traditional Romanian home.

*Keywords*: eco-house, energy consumption strategy, energy efficiency, energy consumption reduction strategy

# STRATEGICENVIRONMENTAL ASSESSMENT (A CASE STUDY: SIGHIŞOARA – TÂRNAVA MARE PROTECTED AREA, ROMANIA)

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## ABSTRACT

Strategic Environmental Assessment (A Case Study: ROSCI0227 Sighişoara – Târnava Mare Protected Area, Romania). This approach seeks to test the applicability and effectiveness of Geographic Information System (GIS) in a Strategic Environmental Assessment (SEA). A GIS and RIAM methodology have been developed and applied to a natural protected area (Sighişoara - Târnava Mare, Romania) included into the European Ecological Network NATURA 2000 (as Site of Community Interest - ROSCI0227). The elements of interest of the area are represented by the presence of 18 natural habitats (e.g. pastures, shrubs and forests) and over 30 threatened species of flora and fauna (e.g. bats, mammals and frogs) which are vulnerable even to minor environmental changes. This area is subject of various pressures related to traditional activities (agricultural, pastoral and forest management), illegal waste deposits, roads and settlements (as sources of in situ environmental pollution), active geomorphological processes, noise pollution, uncontrolled fire and tourism activities. Some sectors of the area are dominated by fragility and there the socio-economic development has a strong environmental impact. Negative impacts on protected area are linked to environmental vulnerabilities and they are assessed by using of a set of common methods (e.g. checklists) and techniques (e.g. Geographic Information System). Positive impacts are related to the socioeconomic benefits (e.g. ecosystem services) offered by protected area for the local community and other stakeholders. In this case, some methods like qualitative benefits appraisal and Rapid Impact Assessment Matrix (RIAM) have been connected by using of GIS technique. Our case study demonstrates that GIS technique has the great potential for improving the traditional assessment methodologies which are based on a mix of quantitative and qualitative geographical and ecological data. We conclude that an integrated SEA based on GIS and RIAM is a powerful tool for sustainable management of biodiversity conservation at regional and local level.

*Keywords*: strategic environmental assessment (SEA), geographic information system (GIS), rapid impact assessment matrix (RIAM), natural protected area, Romania

# FOREST MONITORING METHOD USING COMBINATIONS OF SATELLITE AND UAV AERIAL IMAGES. CASE STUDY - INDEPENDENTA FOREST

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## ABSTRACT

The increasing use of satellite imagery for civilian use has proved to be the most cost efficient means of mapping and monitoring environmental changes. However, for an effective accuracy of results, these techniques should be combined with higt resolution aerial imagines.

For the vast majority of spectral investigation methods, infrared spectral index values are included. Infrared recording devices are quite expensive. In this respect, the possibility of using only the visible RGB domain should be experienced in order to reduce the operational costs by considering extended satellite imaginary. This study presents the results of a general aim: to design, to investigate and to confirm a specific analysis method that uses only the visible RGB spectra aerial imagines in correlations with extended satellite imaginary. For this purpose, in this paper were used Sentinel satellites imaginary.
With this main objective of getting a method with a minimal operational cost was tested - satellite image monitor analysis and UAV high resolution images use. The presented case study is that of Independenta Forest from Galati County. The study was conducted between 2007 and 2016.

*Keywords*: forest model, RGB spectra, minimal operational cost, model validation

# GROWTH RATE MODELING FOR LOCUST TREE (ROBINIA PSEUDOCACIA) IN THE SOUTH EASTERN PART OF ROMANIA: AN IMPORTANT SUBJECT OF FOREST PROTECTION. CASE STUDY - INDEPENDENTA FOREST

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## ABSTRACT

Today, the process of monitoring forested areas is a national necessity. The significance of forests in moderating the climate changes effects is well known. On the other hand, the pecuniary aspects of forest administration are important too. From this point of view, inventorying and assessing the growth and yield rate of forested areas is extremely important. Assessing growth rate per hectare unit and production level of forested areas in order to obtain and accurate inventory is important in determining the supply of wood. The present paper is based on the evaluation after 6 growing seasons for locust tree (Robinia pseudocacia). The study's timespan was between 2010 and 2015, and data from the field have been used. Our results indicated that: (1) the evaluations of the estimated growth rate of production can be vary significantly when employing different statistical analysis and numerical methods; (2) by using numerical optimization models, the computer simulations can provide accurate estimates of the growth rate and, hence, the efficiency for a given forest inventory; (3) common numerical interpolation methods or neural network uses that do not always give consistent results. The specific numerical methods are preferable for a better assessment of the growth rate and existing inventory; and (4) investments in computer simulation methods and software should be encouraged in order to successfully reach a permanent inventory, to improve the efficiency of the logging operations, and to support environmental protection.

*Keywords*: Growth rate; Numerical approach; Statistical analysis; Interpolation method

# REACTOR DIMENSIONS INFLUENCE ON THE OPTIMAL OPERATING SETPOINT CHOICE FOR A FIXED-BED MULTI-TUBULAR CATALYTIC REACTOR

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## ABSTRACT

Setting the optimal operating conditions to fully satisfy the safety requirements for a catalytic chemical reactor of high thermal sensitivity is one of the major engineering challenging problems. The ability of handling highly exothermic reactions in the presence of parametric uncertainty has a high impact on defining the optimal operating conditions of the chemical reactors (Varma et al., [6]). ). In the case of a multi-tubular catalytic reactor (Fig. 1-left), the set-point choice for the operating parameters that control the process (that is the control variables such as the inlet pressure, and temperature, inlet gas composition, the cooling agent temperature) is a multi-objective optimization problem to be solved for each case study [1-5]. Beside the operating control variables, one important design variable is the reactor tube diameter because it is directly related to the reaction heat removal. This paper exemplifies the influence of this design variable on the set-point choice when applying the Pareto-optimal front method [5] with computing the runaway-boundaries by using the generalized sensitivity criterion of Morbidelli and Varma [6].

An elegant option for the multi-objective optimization of the chemical reactor is to get the set of Pareto optimal operating policies, also called Pareto-front for the case of two opposite objectives. A Pareto solution is one where any improvement in one objective can only take place at the cost of another objective (see the result for the approached case study in the Figure 2-left). For continuous variables, infinity of Pareto-optimal solutions can exist, and the final solution choice is subjective and case-dependent [1]. When determining the optimal operating policy, contrary objectives are considered, involving besides economic aspects, also safety aspects, such as controllability, stability, and runaway risk.

By using the methodology of Dan and Maria [1], the Pareto-optimal operating policies are generated for a highly sensitive approached chemical reactor in Fig. 2 for two diameter alternatives of the reactor tubes, by simultaneously considering the reactor productivity and safety objectives (expressed in probabilistic terms), in the presence of technological constraints, uncertainty in safety boundaries, and random fluctuations in the mentioned control variables (Dan and Maria [1]). The example refers to the industrial fixed-bed tubular reactor analyzed by Muscalu and Maria [2-5] for the catalytic oxidation of benzene to maleic anhydride in vapor phase, by using a complex process kinetic model (see main reactions in Fig. 1-right). This paper proves the validity of the Muscalu & Maria [5] concept to choose the operating set-point at the lowest break- point in the Pareto-front.

*Keywords*: runaway boundaries; Pareto front; catalytic reactor; benzene oxidation; reactor size influence

# WATER QUALITY FROM BRĂTENI LAKE AREA, BISTRIȚA NĂSĂUD COUNTY

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## ABSTRACT

The present paper is a study of the water quality sampled from Brăteni lake and the streams near the lake. The analyiys targets the microbiology via DNA extraction, PCR and sequencing of DNA fragments and the chemistry through nitrate and ammonium determination. For the quantification of bacteria present in water samples, 3 culture media were used: R2A for oligotrophic microorganisms, Standard I as a complete medium and Burks for nitrogen fixing bacteria enrichment. The identified bacteria included, Pedobacter, Streptomyces, Bacillus, Flavobacterium and Sphingobacterium. Nitrite and ammonium had higher concentrations in one of the streams near the lake. The results highlighted a close link between land use and lake water quality, agricultural activity having a strong influence on water quality.
BrÄƒteni Lake, water quality, microbiology, DNA extraction, nitrate

*Keywords:* Brăteni Lake, water quality, microbiology, DNA extraction, nitrate

# ACTRIS, A EUROPEAN RESEARCH INFRASTRUCTURE TO UNDERSTAND ATMOSPHERIC COMPOSITION AND ITS LINK TO CLIMATE VARIABILITY

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## ABSTRACT

The ability to predict the future behaviour of the atmosphere over all time scales (hours to decades) brings great benefits to society and the economy. Examples include short-term hazardous weather and health warnings as well as long-term evaluation of climate change and policy effectiveness. Atmospheric predictions of all kinds use complex models that are underpinned by observations. However, any forecast is highly unreliable if there is no sufficient high-quality observation data to constrain predictive models.
This paper presents the goals, structure and plan for implementation of a new European research infrastructure, ACTRIS (Aerosols, Clouds, and Trace gases Research Infrastructure), including the participation of Romanian institutions. ACTRIS focuses on producing high-quality observations of short-lived climate forcers (e.g. like clouds) and short-lived atmospheric components (e.g. trace gases). Their temporal and spatial distribution is highly variable and is the result of processes occurring on very short timescales.
Through its comprehensive and highly accurate observations, ACTRIS aims at answering to a number of scientific questions: a) How aerosols and trace gases affect Earth's radiation balance; b) How will clouds respond to a warming climate, considering the large uncertainties due to the complexity and feedbacks of cloud systems and their interactions with aerosols; c) What are the concentrations and distributions of aerosols and trace gases contributing to air pollution and related adverse effects on health and ecosystems; d) How can the impact of climate-induced feedback mechanisms on atmospheric composition be quantified?

*Keywords*: atmospheric composition, climate change, research infrastructure

# THE ANTHROPIC IMPACT ON THE ECOLOGY OF THE AQUATIC ECOSYSTEM OF THE LOWER NISTRU RIVER

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## ABSTRACT

The Nistru River hydrographical basin occupies an important place in the structure of the natural territorial complexes of the Republic of Moldova. The Nistru is a cross-border river that flows across Moldova and Ukraine. The fact that it is the primary source of drinking water to supply the population of both countries living in the accumulation basin, defines its value and importance in relation to the terrestrial ecosystems.
The Nistru is the largest river artery in Moldova as well as a receptor of waste and polluting substances on an area inhabited by more than one million people. In the structure of natural complexes the river system is studied as an ecosystem divided into several segments, the last being the Lower Nistru, where the surface leakage is only 0.2 l / sec per sq. km. According to the data obtained as a result of the investigations carried out, it was determined that one of the ingredients with the highest values is the solid suspension coming from several sources and which in 2006 - 2016 reached in average in the Tighina section - 45 mg / $dm^3$, in Tiraspol - 35 mg / $dm^3$ and in Olanesti - 40 mg /$dm^3$. Among other pollutants characteristic of the Lower Nistru water are persistent chemicals, petroleum products, and nitrogen and phosphorus compounds. The unfavourable ecological status of the river water has a negative influence on the hydrobionts of the Lower Nistru ecosystem.
Data on the dynamics of Nistru River water quality during the last 10 years are reflected in the present paper in order to establish ways to improve the ecological situation and to solve problems arising from mutual interactions with terrestrial ecosystems, including urban ecosystems.

*Keywords*: ecosystem, water pollution sources, river system, urban ecosystem, aquatic ecosystem, river basin.

# PERCEPTION AND MOTIVATION OF SCHOOL CHILDREN REGARDING RECYCLING IN ROMANIA

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## ABSTRACT

Although the modern media has multiple opportunities to provide information regarding the environmental issues, there is still a lot of confusion in this regard. This is even more visible in post-communist societies, as in the case of Romania. Starting form premises like: environmental awareness starts from an early age, eco-friendly policies are encouraged by the state, inefficient or lacking awareness campaigns, social networks and internet are the main source of environmental information among school children, we designed this study to verify the premise above and to establish a more efficient way of raising awareness among the citizens regarding environmental issues, i.e. recycling.

The method used is of a questionnaire applied to school children aged 8-18 years old, most of them participants in a private mountain camp. Their social status is middle to high, and the residence is from all over Romania. The questionnaire has 25 closed and open questions that verify their environmental knowledge, previous experience towards elements of motivation and perception of their self-person and exterior world. A total of 295 questionnaires were applied, with even gender distribution.

The preliminary results of the study show that the young participants possess basic environmental knowledge, although very often they lack the explanation for the respective notions. They are given raw information without being taught to think, resulting in lack of interest and motivation. They are prone to using the internet and social networks, but they prefer gaining their information from authority figures like school teachers (girls – 16.3%) or family (boys – 12.9%). This study shows the perception and motivation of school children regarding the recyclable waste collection. Our aim for the near future is to expand the study to a larger number of secondary school students, aged 14-18 years old, residing in Cluj Napoca and nearby areas, in order to find the best mechanisms for improving the recycling awareness among the general population.

Acknowledgments: The authors thank Prof. Dan Chiribuca for the help provided during the questionnaires' design.

*Keywords*: recycling, environmental, awareness, school children, motivation, perception, waste collection, social networks, questionnaire

# ENERGY STRATEGIES OF USING RENEWABLE ENERGY FOR SUSTAINABLE REGIONS

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## ABSTRACT

Nowadays the issue regarding availability of different energy resources on a global level is a very discussed one on socio-political level, as well as on scientific level. Renewable energy resources are representing a source of clean and inexhaustible energy and due to their diversity and potential to be used anywhere on the planet, where they are available, they are increasingly becoming competitive energy resources from an economic and environmental point of view. Moreover, the so-called â€ťsustainableâ€ť energy is a type of energy which is able to fulfill the growing demand of todayâ€™s people in increasing their quality of life without compromising the ability to fulfill peopleâ€™s demand that will be required in the future. As a member of the European Union, Romania has assumed a number of aims and one of them is to increase the share of green energy in electricity consumption to more than a quater until the year of 2020. This means that national and regional strategies of using renewable energy sources are required to be established by respecting the general assumed objectives on European level. In this way, certain regions will make steps forward in the direction of becoming sustainable regions, at least from the point of view of covering the increasing energy demand but without supplementary negative environmental impact. In order to evaluate on regional level, possible environmental impacts because of implementing certain renewable energy strategies, several establishing ways and calculation procedures can be applied. One pretty used procedure is represented by determination of environmental footprint of a certain energy type. Actually by applying such a calculation procedure it can be estimated which strategy regarding using different energy resources does represent a sustainable strategy for the future use of energy resources. In this paper, the establishing way of the environmental footprint of using a photovoltaic panel system is presented by calculating the corresponding CO2 emissions. Moreover, with the help of the just established environmental footprint, the time period is calculated so that a photovoltaic panel system would have to operate, in order to neutralize possible pollutants emissions, that would occur, if electricity would be produced by using fossil fuels. Actually only after this time period, the photovoltaic panel system is becoming a sustainable energy resource. In the end, appropriate measures for decreasing the environmental footprint, thus the environmental impact will be established, by debating different optimizing possibilities.

*Keywords*: renewable energy, photovoltaic panel, energy strategy, environmental footprint, sustainable region

# TESTING BIOMONITORING CAPACITY OF NORWAY MAPLE (ACER PLATANOIDES L.) AGAINST AIR POLLUTION WITH HEAVY METALS (CU, ZN, PB, CD, SI)

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## ABSTRACT

Air pollution in urban areas is of perpetual interest, mainly because of the heavy traffic. Even though serious efforts are made, at both legislative and local authority's levels all over the world, it remains a problem to be solved. In this context Romania is not an exception. Cluj-Napoca, classified according the last census as second city in Romania, in terms of number of inhabitants, after Bucharest, confronts with a very heavy traffic. This reality opens a perspective that may involve serious costs for monitoring heavy metals air pollution. An alternative may be the use of ornamental trees, usually encountered in green spaces of Cluj-Napoca, as biologic agents for monitoring heavy metals air pollution. The trial was developed during April – September 2017, in Cluj-Napoca, in two locations, corresponding as placement, to The Monitoring Stations CLU-2 (of urban type), and CLU-3 (of suburban type), placed by the Agency of Environmental Protection Cluj, in the city center, nearby Nicolae Bălcescu high school, and in Grigorescu District, respectively. Foliar tissue from the base of canopy of 2 Acer platanoides L. trees by experimental site were harvested twice a week during experimental period.
Identification of heavy metals (Cu, Zn, Pb, Cd, Si) content of foliar tissue was performed by X-ray spectrometry. STATSTICA v. 7.0 for windows was used for raw data processing. Climatic parameters (air temperature, rainfall regimen, pressure, and wind velocity) were collected from official data. The means of Cu, Zn, Pb, Cd, and Si concentrations in foliar tissue of Acer platanoides L. were expressed as monthly concentrations by individual tree, and also as mean by entire experimental period.
The values of studied heavy metals mean concentrations were compared with data from literature, which state the thresholds in Acer platanoides L. specie. The results of our trial emphasize increased values for silicium content of vegetal tissue, over literature threshold limits, and this suggests the suitability of using Acer platanoides L. as biomonitoring agent for air pollution with silicium.

*Keywords*: foliar tissue, ornamental tree, traffic, X-ray spectrometry

# BIG DATA ANALYSIS FOR RADON MAP

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## ABSTRACT

The presentation focus on reviewing the current state of the art at international, European and national levels regarding both indoor and outdoor radon monitoring and revising the publicly available data sources about radon measurement.
Due to the various information sources regarding radon measurements and various existing data formats, the presentation introduces a model of an unified framework for radon measurements collection, aggregation and presentation by using a mixture of technologies from “Big Data” and related fields.

*Keywords*: radon monitoring, radon map, big data

# A CORRELATION BETWEEN HEAVY TRAFFIC AND AIR QUALITY IN WESTERN SUBURBAN AREA OF CLUJ-NAPOCA

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## ABSTRACT

In the last years, the heavy traffic became a problem in many cities. In this paper we analysed the evolution of traffic in western suburban areas of Cluj-Napoca - Floresti. According to the Cluj-Napoca Sustainable Urban Mobility Plan, the segment of DN1 road between Floreşti and Cluj-Napoca is the most agglomerated road from Romania with a daily mean of 58 860 cars during the working days. Also we analysed the evolution of air quality in correlation with the traffic. We considered the particulate matter - $PM_{10}$ and nitrogen oxides, mainly $NO_2$ as the main air pollutants resulted from traffic. Data have been collected from the National Air Quality Network suburban station, CJ-3, located in the study area, in the last 5 years. We identified a relation between traffic and air quality and also a clear difference between working days and weekends.

*Keywords*: land use planning, traffic, air pollution, $PM_{10}$, $NO_2$.

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# WOOD ASH ADMINISTRATION FOR IMPROVING GROWING PERFORMANCES OF PEAR SEEDLINGS IN NURSERIES WITH ACID SOILS

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## ABSTRACT

Cluj County is s representative region for pear tree production in Romania, because of the climatic and pedological traits of the region, which allow an appropriate development of both tree production and pear seedlings development. Because of the increased worldwide interest recorded in the latest decennial in producing organic fruits and fruit products with low inputs, special concern is raised by the pear trees and pear seedlings cultivation technologies. In this context, our research aims to test the opportunity of using wood ash resulted from wood debris furnaces, as both acid soil amendment and fertilizer, in pear seedlings nurseries, where acid soil is present, taking into account the environmental climatic conditions. The trial was organized in a pear tree nursery, with an area of 1000 m2, located in Vâlcele village, Feleacu commune (46°42′50″N 23°39′08″E), Cluj County, according to a trifactorial experimental design (amendment/fertilization x soil type), in spring-autumn of 2017. The biological material was made of pear seedlings, Napoca variety.
Three experimental plots were organized: control – without amendment/fertilization and phytosanitary treatments, plot 1 – sandy soil with amendment/fertilization, and phytosanitary treatments, and plot 2 – acid soil, with amendment/fertilization, and phytosanitary treatments. Climatic conditions were daily recorded with a mobile meteorological station. Wood ash characterization was performed previous to field administration, in order to identify possible toxicity. In order to process raw data, basic statistics was applied using STATSTICA v. 7.0 for windows. The results of our trial, in terms of pear seedlings development, emphasize better performances when amendment/fertilization with wood ash was administered to acid soil, comparable with those obtained on sandy soil (the differences were not statistically assured at significance threshold of 5%), and much better if compared to control. Even further research is needed, our trial show the possibility of successfully using wood ash as amendment/fertilizer for pear tree nurseries, and, in the meantime, delivers a contribution to sustainable development of tree rearing by using a natural, environmentally friendly product.

*Keywords*: amendment, experimental design, fertilizer, variety

# RADON MITIGATIONS IN BĂIȚA-ȘTEI RADON RISK AREA (ROMÂNIA)

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## ABSTRACT

Radon contributes to over than 50% of the natural radiation dose received by people. In radon risk areas this contribution can be as high as 90-95%, leading to an exposure to natural radiation 5-10 times higher than normal. In residential houses with indoor radon concentrations higher than 300 Bq/m$^3$ it is necessary to make radon diagnosis with systematic measurements in order to find the source (soil or building material), and to reduce risk by radon mitigation techniques.

These work present radon mitigations in 21 houses from Băiţa-Ştei radon prone area (SE of Bihor County) which were selected from an indoor radon survey of 305 houses. Around 10% from the investigated houses have concentrations up to 600 Bq/m$^3$, which classify the area as "radon risk area", and in which the indoor radon levels had have the main radon sources the basement sub-soil and secondary the contaminated building materials. In the selected houses the applied radon mitigation techniques were based on the depressurization and pressurization of the building sub-soil in combination by a wind and an electric fan, and were applied radon barrier membrane. The remedial measures for the 20 houses were tested on a pilot house from the area. Finally, the remediation efficiency obtained for the mitigated houses were in the range of 65.2 - 95.1 %, by a mean value of 81.4 %.

# BLACK SEA (SHABLA AREA) TSUNAMI MODELING USING TWO DIFFERENT SOFTWARE

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## ABSTRACT

There is an evidence of 22 tsunamis generated in the past in the Black Sea (Altinok Y., 1999). The most dangerous area for the Romanian and Bulgarian shorelines is Shabla, area that might trigger high magnitude earthquakes and tsunami waves. According to the National Oceanic and Atmospheric Administration (NOAA) data base, there were 3 important events in the area: the most recent event, on 31st of March 1901, when a 7.2 M earthquake triggered waves of 5 m (Papadopoulos et al., 2011), other sources estimating 2.5 - 3 m height (Ranguelov & Gospodinov, 1995); the oldest event, in the 1st Century BC, in Bisone area (Nikonov, 1997) and the third one, in year 543 AC, when an earthquake of 7.5 M generated tsunami waves of 2 - 4 m (Ranguelov, 1998).
Tsunami modeling scenarios were accomplished for the Shabla area, using past earthquake parameters (magnitude, location, depth, focal mechanism) and two different software: the Tsunami Analysis Tool (TAT) developed by the Joint Research Centre (JRC), Ispra, Italy, and TRIDEC Cloud, provided by the German Research Center for Geosciences (GFZ), Potsdam Germany. After analyzing the tsunami modelling scenarios, a comparison between the results of the two software was accomplished, for the same input earthquake parameters: magnitudes of 7, 7.2, 7.5 and 8, depths of 5, 10 and 30 km and 5 fault plane solutions. The results are as follows: the worst case scenario for TRIDEC Cloud shows waves of maximum 2.62 m in Varna, for a possible earthquake of M 8 (Solakov et al., 2014), at a depth of 5 km, with 0.32 m in Constanta; the worst case scenario for TAT displays maximum waves of 4.3 m in Kamen Bryag, for the same earthquake parameters, with 3 locations from the Romanian shore affected (2 m maximum waves in Costinesti). Moderate tsunami waves are given by scenarios using magnitude 7.5, with 0.6 - 0.8 m maximum heights in Varna (Bulgaria). For lower magnitudes (7 - 7.2), the modeling estimates very low waves, of 0.2 - 0.4 m waves in Varna.

*Keywords*: tsunami modeling, Shabla area, Black Sea, earthquakes

# THE 8TH OF SEPTEMBER 2017 MEXICO M 8.1 TSUNAMI EVALUATION IN SUPPORT FOR AUTHORITIES' RAPID RESPONSE

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## ABSTRACT

An earthquake of magnitude Mw 8.1 occurred on 8th of September 2017, at 04:49 UTC, offshore Mexico, Chiapas area, at a depth of 72 km (European-Mediterranean Seismological Centre - EMSC-CSEM), which generated a maximum tsunami waves of around 1.1 m were measured at Salina Cruz, the nearest sea level station from the epicenter. The focal mechanism of the earthquake was normal fault plane. Tsunami modeling was performed based on the first earthquake parameters estimates. Two software were used for modeling, Tsunami Analysis Tool (TAT), provided and developed by the Joint Research Center, Ispra, Italy (Annunziato, 2007) and TRIDEC Cloud, provided by the German Research Center for Geosciences (GFZ), Potsdam Germany (Hammitzsch et al., 2016). After analyzing the modeling scenarios and comparing the affected locations, sea level estimates and maximum wave heights, results showed that TAT overestimates the maximum waves generated with 1.7 m wave heights at Pasito de la Senora, and TRIDEC, on the other hand, gives a more precise value, similar to the measured one (1 m waves at Salina Cruz). The two software are used for near-real time global tsunami monitoring, rapid warning and decision support in case of a worldwide high magnitude earthquake followed by a tsunami. In the framework of relevant international projects (Global Tsunami Monitoring Service 2 - GTIMS 2, All Risk Integrated System Towards Trans-boundary holistic Early-warning - ARISTOTLE), the rapid estimates resulted from modeling were very helpful in providing first assessments of tsunami waves highs and possible casualties to the European Civil Protection, as a complementary tool for already existing Global Disaster Alert and Coordination System (GDACS).

*Keywords:* Mexico earthquake, Tsunami Analysis Tool, TRIDEC Cloud, tsunami modelling

# PHYTOREMEDIATION OF POLLUTED WATER FROM ROSIA MONTANA MINING AREA

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## ABSTRACT

Phytoremediation tests for heavy metals removal were performed with aquatic species Lemna minor, Pistia stratiotes, Vallisneria spiralis, on contaminated acidic waters collected from Rosia Montana mining area, in 2016. The study was conducted in micro containers with contaminated water using constructed wetlands. Two types of experimental waters for each species have been used: drinking plain water as blank and drainage waters collected from Abrudel river downstream Gura Rosiei tailings dump and Selistei Valley downstream Saliste tailings dump. Heavy metals concentrations were measured by inductively coupled plasma mass spectrometry using an ELAN DRC II (Perkin Elmer) spectrometer, and the water quality parameters (pH, Eh - oxidation-reduction potential, EC- electrical conductivity, TDS - total dissolved salts and S - salinity) were analyzed using a 320i multiparameter (WTW), before and after the phytoextraction process. During two weeks, the phytoextraction experiment with aquatic species (L. minor, P. stratiotes and V. spiralis) showed a significant decreases of heavy metals concentrations, with an efficiency of 6.54- 25.80% for Pb; 9.85% -66.29% for Al; 100% for Cd; 59.54%-78.63% for Ni and 32.91% - 48.37% for Zn, in case of Abrudel river water, while in case of water from Selistei Valley significant decrease of Al (30.40 %), Ni (21.10%), Pb (60.86 %) and Fe (88.71 %). Vallisneria spiralis has shown high phytoremediation efficiency by increasing pH (24.13%) and EC (3.36%) and decreasing Eh (808.22%). The promising results on phytoremediation of contaminated acidic drainage waters using aquatic species in constructed wetlands indicates the possibility of implementing this biotechnology.

*Keywords*: heavy metals, phytoremediation, Lemna minor, Pistia stratiotes, Vallisneria spiralis

Acknowledgments: The present contribution was supported by a grant of the Romanian Executive Unit for Financing Higher Education, Research, Development and Innovation (UEFISCDI), project PN-III-P1-1.2-PCCDI2017-0721.

# SWITCH THE BUTTON ON TEMPERANCE-ORIENTED BEHAVIOR. OF CONSUMERS AND THEIR FOOD WASTE

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## ABSTRACT

In modern societies, self-definition and collective definition are almost impossible to be made without referring to consumer goods – a hallmark of our lifestyle. Thus, consumerism arrived to be a motive to invoke temperance more and more often. The overall purpose of the present research is to place landmarks on the route of people's actions towards a more proactively attitude within a virtue ethics perspective that values the environment by adopting a waste reduction behavior. Authors propose for the current discussion the focus on two behaviors where temperance can really make a difference: (i) temperance in food wastage and (ii) temperance in loading the environment with (already purchased) food – waste. Study results extend the scant information on citizen food waste behavior in relation to religion, underscoring the relationship between temperance oriented-behavior and environmental concerns.

*Keywords*: Temperance, Food wastage, Consumer behavior, Fast, Environment.

# EVALUATION OF FOOD QUALITY FROM THE POINT OF VIEW OF CONSUMER HEALTH AND ENVIRONMENTAL PROTECTION

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## ABSTRACT

Starting from the premise that consumers play an important role in influencing the pressure that the food sector puts on the environment through their food choices and that these choices are influenced by their assessment of food quality, this study presents the results of a survey that investigated consumer attitude toward food quality. The objective was to obtain an image of consumer perceptions and knowledge on food quality and habits regarding food quality evaluation. Results show that freshness, taste and price are among the most important quality indicators for tested consumers. Environmental concerns are present in consumer minds, but they have lower importance as food quality evaluation attributes. The findings convey the ideas that investigated consumers pay attention to food quality and that more should be done in order to increase the awareness of environmental impact of food production and consumption.

*Keywords*: food quality, consumer, perceptions, quality evaluation, health, environment

# SHIFTING TOWARD A WASTE REDUCTION BEHAVIOR. THE CONSUMER'S STORY

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## ABSTRACT

Increasing generation of waste along with resources depletion, constantly raise the importance of better waste management, to which the study of waste generators behavior can bring a relevant contribution. The present analysis casts light on several aspects related to selective waste collection behavior. The types of waste for which there were the most frequently encountered waste disposal facilities in the cities were investigated: paper, plastic, and batteries and bulbs. It was observed that among tested persons, 42% of them collected and disposed selectively most of their paper, 38% collected and disposed selectively most of generated plastic waste, and 33% did this for most of their used batteries and bulbs. The preferred disposal location type was waste bins dedicated to a specific waste type, mentioned by 47% of respondents. The study highlights the importance that household waste generators have in recycling, reusing and diminishing the negative impact of waste, in order to promote the idea that more must be done to support and stimulate household waste generators to collect and dispose their waste selectively.

*Keywords*: waste, selective collection and disposal, behavior, environmental protection

# THE USE OF GEOTHERMAL WATER IN THE CULTIVATION OF SOME ALGAE SPECIES: A REVIEW

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## ABSTRACT

Green algae have been and are being studied because of their commercial importance as a source of essential amino acids, vitamins, fatty acids and proteins. Most cultural systems today are open ponds. In Europe, Poland has beneficial conditions for broad geothermal use, with one of the renewable and sustainable energy sources. Romania has a remarkable potential in terms of geothermal energy, being considered, after Greece and Italy, as having great opportunities to use geothermal resources. Only one city in the country, city of Beius, relies entirely on this type of heating energy for homes and has important projects to become a true geothermal ecological center.

In the present study, geothermal water could be used to prepare the microalgal culture medium to heat greenhouses used to grow algae, and to dry the biomass obtained. The use of geothermal water offers the possibility of producing algae in open ponds covered with greenhouses and plant cultivation in winter. The obtained algae can be used for the production of bio-products, biogas, algae biodiesel, with potential for application in plant cultivation.

*Keywords*: green algae, geothermal energy, geothermal water, sustainability.

# ANALYTICAL STUDY ON ELECTROMAGNETIC SMOG

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## ABSTRACT

The modern development of all areas where electricity is used has led to the pollution of the environment and to the bad influence of electromagnetic radiation on any living organism. It is certainly an attack on the health of the population and on the global climate change. Obvious we can't imagine the modern life on Earth without electricity, but mankind needs to be informed by introducing a multidisciplinary research theme that contributes to sustainable (social and economic) development for environmental protection and to understand the consequences that follow by the explosions of energy that shed the Earth. Following the research on electromagnetic fields and waves from the environment we have been focused on the following points: an urban center, a public educational institution and a family home. The objectives of the paper highlight the sources of pollution, their impact on the environment and the human body, the measurement and evaluation of risks and design of a monitoring system for electromagnetic pollution.

*Keywords*: electromagnetic smog; radiowave pollution; microwave pollution; thermal radiation; monitoring of the electromagnetic pollution.

# FROM CHALLENGES TO OPPORTUNITIES: IMPROVING WASTE MANAGEMENT IN CLUJ-NAPOCA, ROMANIA

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## ABSTRACT

Romania deals with serious problems related to waste management; these mainly refer to: high waste landfilling rate and low waste recycling rate, the incapacity of closing 68 non-ecological municipal waste landfills, and delaying the update of the National Waste Management Plan. The management of waste generated in Cluj-Napoca falls within the larger framework of waste management at national level that should be regulated by EU Directives and integrated within the context of circular economy.
Cluj-Napoca Municipality also faces similar issues since the integrated waste management system is not operational, only a small percent of waste is diverted from the landfill, a considerably percent of waste recycling is being performed by the informal sector, and the process of rehabilitation of the former Pata Rat Landfill site is not being finalised. The study (1) analyses the city's current waste management process, (2) it reviews the characteristics of household waste generated in Cluj-Napoca, from previous studies and (3) highlights the challenges and opportunities associated with the current situation of waste management in Cluj-Napoca. The purpose of the study is to present local solutions to improve waste management after analysing all issues mentioned above.
Finally, the study revealed and forwarded some important recommendations in order to increase the performance of waste management in Cluj-Napoca.

*Keywords*: waste management, waste characteristics, waste recovery, circular economy

# POSSIBLE USING OF NBS FOR THERMAL STRESS MITIGATION

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## ABSTRACT

Thermal stress is a problem for urban areas by the perspectiv of the most frecvent risks. Developed areas have the biggest proportion as surfaces in urban areas. This is generating a dezequilibrum between developed areas and green areas, for instance. The existence of green-blue infrastructures can moderate temperature in urban areas.
To evidence these aspects were used Landsat imagery as Landsat 4-5, Landsat 7 (with SLC on) and Landsat 8 from 1985 to 2017. The images have 30 m resolution. From this images were extracted the mean temperatures for the summer and the land use for the analyzed period. After that, we made an analyzed of the differences between groups, temperatures and types of land use.
The main objectives for the study are to identify the areas with thermal stress in urban areas (1) and to analyze 3 urban tissues as study cases for the possible using of NBS in thermal stress mitigation (2).
The results show that there is a smaller thermal stress in the areas where we have green-blue infrastructures and where the developed areas are is discontinuous. The areas with high thermal stress were compared and modeled to validate our hypothesis that NBS are reducing the thermal stress in areas that are now stressed.

*Keywords*: thermal stress, NBS, Landsat, urban, Bucharest

# TEXTILE SLUDGE RECOVERY FOR OBTAINING CONSTRUCTION MATERIALS

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## ABSTRACT

The textile industry significantly pollutes the environment and affects the human health through the generated wastewater. Its treatment processes generates the sludge whose management lead to high costs. The pollution, as well as the economic disadvantages, can be reduced by introducing new innovative solution for their recovery. This research aims to present the characteristics of the required wastewater treatment and of sludge for obtaining bricks and plaster materials, in order to mitigate pollution. Some results indicate centrifuged sludge mixes of 45% cement and 55% sludge for bricks and of 25% cement and 75% sludge for plaster materials, while complying with all the Romanian legal requirements in the field.
The methodological framework gathers information related to: waste sampling, control of sludge management, analyses and monitoring of sludge characteristics, revision of legal norms in the field, and tests of new products from sludge and other materials for construction sector. The obtained construction materials could lead to improvements of waste recovery, thus contributing to the circular economy and, further, to sustainable development. This research presents the results of an experimental study on obtaining bricks and plaster construction materials from the industrial sludge by using the Romanian patent no. 125384/30.06.2014 in the context of a funded research project.

*Keywords*: experimental study, sludge, sustainable development, wastewater treatment, waste

# INNOVATIVE DEVICES OF ECO-ELECTRICITY PRODUCTION FROM MULTIPLE SOURCES OF ENERGY

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## ABSTRACT

The renewable energy installations that are developed at this moment, have the disadvantage of covering impressive landscapes with a strong negative impact on the environment. Also, many accidents have been noted in the use of the classical systems that produce electricity from renewable energy. This research has as main objective the accomplishment of a vertically developed device that captures and transforms, into an integrated system, the solar radiation, the wind power and the hydraulic energy in eco-electricity, especially for disadvantaged areas. These systems are safe in operation, because they combined elements that protect the integrated device, in case of extreme weather phenomena.

*Keywords*: Renewable energy, device, integrated systems, eco-electricity

# MINERAL DUST IMPACT ON THE AMOUNT OF RAINFALL, IN THE NORTH-EASTERN PART OF ROMANIA

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## ABSTRACT

The impact of mineral dust on cloud droplets and on the amount of precipitation has been extensively studied by several authors. Some of them used theoretical models, who predicted that precipitation would be increased. Others have submitted observations that have shown the opposite, meaning that mineral dust has inhibited precipitation. These contradictory results show that the impact of mineral dust on the clouds, respectively on the precipitation field, depends on the atmospheric conditions. In this study, our main aim is to identify how Saharan dust has altered the precipitation forecast over the northeast region of Romania (Moldova).

It is already know that the first global source of atmospheric mineral dust is the Sahara desert. Here is produced about half of the total annual amount of mineral dust. Studying the transport processes and deposition of dust is important to understand current processes in order to be able to predict future climate processes and changes in the energetic balance of the atmosphere. Saharan dust can have also seriously potential health impact.

Furthermore, in this report the transport process analysis and distribution of the Saharan dust events over the Romania country will be presented. In this context it necessary to perform studies of this mineral dust and about the composition of the particles, how they are transported and the effects that it can have on the areas in which it is deposited.

*Keywords:* mineral dust, precipitation forecast, clouds

# RISK MITIGATION BY SPACE ACTIVITIES FOR GLOBAL SUSTAINABILITY

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## ABSTRACT

The desire to achieve sustainability on global level, irrespective of technological development, economic prosperity and socio-political situation, that can be very different from a region to another, has in the last time pushed forward debates regarding existing possibilities in this direction. Anyway the general progress in many activity fields has always encouraged the humanity vision in steadily increasing its quality of life. Registered developments on a global level have however pointed out that beside target effects of technological progress, undesired and even unthinkable negative effects of this progress can appear.
Humanity is currently confronted with a series of global problems, not only environmental ones, but also economic and socio-political ones, their complexity basing on their interconnectedness as well as on the fast changes taken especially place in technological field. It has been recognized that these global problems are more or less connected to several smaller or bigger risks in all human activity fields. In order to find solutions for the identified global problems debates on scientific, political and social levels have worldwide started some time ago. As a consequence in the Brundtland Report 1987 for the first time the concept of sustainable development has been defined and accepted as a possible solution for the global complex ecological, economic and social problems. Getting global sustainability would mean registering developments with conceivable risks or even developments with minimum possible risk level. In this regard a development which is sustainable would mean a development with dischargeable risk, where risk mitigation strategies can be best explored and implemented.
When considering the technological field, the current vision is to develop technologies by respecting the concept of sustainable development, i.e. by shaping sustainable technologies. In this regard Technology Assessment has to be used, which tries to give an answer to the question: Which are technologies that we need, how are these technologies to be developed and how do they integrate into environment and society? Technology Assessment brings together almost all scientific disciplines with the common goal of finding best ways for sustainability operationalisation not at last by finding best rick mitigation strategies. It actually points out that there are new evaluation criteria for technological applications, that include not only technical and economic aspects, but also environmental and social ones. All these evaluation criteria should be considered in sustainability decision-making processes also regarding Space Activities by rick mitigation strategies. Applying Space Activities for shaping Global Sustainability is especially meaning setting up regional and global Emergency Programs in order to support disaster response operations through the provision of satellite data. In this regard the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) is implemented as an open network of providers of space-based solutions in order to support disaster management activities with the foremost goal of risk mitigation on global level. With the vision of applying Space Activities for Risk Mitigation, the UN-SPIDER program should be globally implemented in the future.
The role and challenges of Space Activities for getting Global Sustainability will be debated and their possible contribution will be especially emphasized for Risk Mitigation on regional and global level.

*Keywords*: Space Activities, UN-Spider, Risk Mitigation, Technology Assessment, Global Sustainability, Systemic thinking

# STUDY ON THE EUTROPHIC STATUS OF SELECTED LAKES RIPARIAN TO THE COLENTINA RIVER, BUCHAREST, ROMANIA

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## ABSTRACT

It is generally accepted that eutrophication of surface waterbodies is a major issue of water quality as it affects both economic and social environments. Recent studies have pointed climate changes as a potential major factor that may lead to accelerated eutrophication of rivers and lakes [1]. The synergic contribution of climate changes coupled with the anthropic activities [2], have drastically facilitated the transfer of nitrogen and phosphorus between the environment and the aquatic ecosystems, leading to different distributions and accumulations of pollutants between the biotic and abiotic phase caused by their chemical and biochemical interactions [3].

The aim of this paper was the evaluation of trophic status of three lakes riparian to the Colentina River (namely Mogosoaia, Herastrau, Pantelimon) in 2016. Water and sediment samples were taken from the upstream and downstream areas of each lake in two sampling campaigns; the following indicators were measured: temperature, pH, ammonium ($NH_4$-N), nitrites ($NO_2$-N), nitrates ($NO_3$-N), total nitrogen (TN), orthophosphates ($PO_4$-P) and total phosphorus (TP). The relationships between the total nitrogen and the total phosphorus content from water and sediment were assessed.

The results showed that the nutrients in Mogosoaia and Pantelimon Lakes had a increasing tendency for the study period. Moreover, a significant build-up of nitrogen and phosphorus was detected in sediments, acting as remnants nutrients deposits from anthropic activities, agriculture, uncontrolled waste disposal etc.

It has been noticed that a more stringent enforcement of the Action Plan for the Environmental Protection is required, focusing on the uncontrolled waste disposal and inadequate sewer systems.

*Keywords:* eutrophication, nutrients, lakes.

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# ATTENUATION RELATIONS FOR THE SEISMIC GROUND MOTION INDUCED BY VRANCEA INTERMEDIATE-DEPTH EARTHQUAKES

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## ABSTRACT

The Vrancea seismic source, located at the South-Eastern Carpathians Arc bend in Romania, is generating extreme destructive subcrustal earthquakes not only for a large part of Romania, but for the neighboring countries as well. Assessing seismic hazard implies evaluation of the expected ground motion level at different sites, and an essential parameter for this evaluation is the attenuation of the propagating seismic waves. All the related investigations carried out up to present used only ground motion data recorded for the Vrancea largest events (Mw ≥ 6.0), considering that these events are representative for seismic hazard computation. The purpose of the present study was to extend the analysis to moderate-size earthquakes (4.0 ≤ Mw ≤ 6.0) and to compare the attenuation and directivity effects specific for moderate earthquakes against the similar effects of the major earthquakes. To this aim we selected a dataset of 58 earthquakes occurred between 1997 and 2007 (4.0 ≤ Mw ≤ 6.0) and recorded by the digital strong motion network of the National Institute for Earth Physics. Attenuation relations were obtained applying a multiple regression procedure. The peak ground acceleration as measured on the horizontal components are considered. A set of correction factors for the observed accelerations is estimated in order to take into account local soil conditions at the recording stations. The predictive equations are calculated for two active segments generating earthquakes in the Vrancea subcrustal source: 60 ≤ h ≤ 110 km and 110 < h ≤ 180 km. Predicting ground motion parameters specific for large events on the basis of attenuation/directivity relations evaluated for moderate-size events from the same source is questionable in most cases. Our results show that for the particular case of Vrancea intermediate-depth earthquakes, such extrapolation can be useful and scaling effects can be relatively well constrained allowing this way valuable assertions for seismic hazard assessment based on extended databases including smaller and more numerous earthquakes.

*Keywords*: attenuation relations, ground motion parameters, subcrustal earthquakes, Vrancea source, seismic hazard

# THE ACTUALLY PROBLEM OF THE WASTE MANAGEMENT IN ROMANIA

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## ABSTRACT

The waste management in the world it's a currently problem of the society and of decision makers. the demographic growth influences directly the generation of waste, and the global and local waste management. in romania the problem related to waste management is represented by the lack of recycling and the reduced number of compliant landfills. at the level of 2017 there were 43 landfills serving approximate 20 million inhabitants and were generated 5.22 million tonnes/year of municipal waste. this amount of waste converted into cubic meters would be about 16.3 million cubic meters, but the total capacity over the entire period of operation of the landfills is about 110-120 million cubic meters. from the total of generated waste, only 5% are recycled, the rest are stored in landfills.

# DETECTION OF ISOTOPE STABLE RADIOACTIVE IN THE MARSHES OF SOUTHERN IRAQ BY USING GIS

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## ABSTRACT

This study was conducted to indicate Isotopic Stable Radioactive element (ISRe) of the Iraqi marshes by using Geographic Information Systems (GIS) to implement the comparing these elements with World Health Organization elements (WHO), and the Food and Agriculture Organization (FAO), this study achieved in several phases: Work included access to geographical data in six main stations of the Missan governorate (Al- Auda Marsh, Al- Battat Marsh ) during October 2016 period and selection of environmental factors Water and Soil . Results of water in all stations under study showed low concentrations of ISRe Pb212, Pb214,Pb138 and the remaining elements varied and mostly similar limited factors with natural boundaries of water bodies, A little increase come from of some pollutants that are discharged from the water drainage or waste populated .The soil samples showed ISRe, Pb214, Pb212, Pb138 , this may be due to the disintegration of the former previous radioactive element in the same region after wars or explosions , the remaining elements were found in variable concentrations . This database considered as a very important for environmental risks and health in aquatic environmental of marsh which can be updated through a unified future other periodic data. It is one of the method efforts of research for the Iraqi marshes because it represents the concept of ecological zones are covering relatively large areas in southern Iraq, which have a distinctive character of the natural geography of different types so there is a relationship between organisms and their environment an important in an aquatic ecosystem of the food chain.

*Keywords*: Iraqi marsh, pollution, Bioindicator, Isotopic Stable Radioactive

# DRONE APPLICATIONS SUPPORTING FLOOD MANAGEMENT

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## ABSTRACT

There are more and more drone applications around us: we can find examples from the military sphere to the civil use but more and more application can be found also in the topic of disaster management.
Disaster managers usually suffer from the limited resources therefore measuring any new method or innovative equipment what can reduce in this limit is not an option but an obligation for the experts. This article examines the possibilities of drone applications in case of flood management. Method: This article focuses mainly on author's own practices and experiences using drone however practices and experiences made by others were also adapted to the results of the study as well as the examples wrote in the relevant literatures. Results: On the time scale there are three different options for using drone to support disaster management. Before floods drone can take river bed surveys as a kind of preventive application. During flood management drone can support decision makers with the "eagle eye" view of the flooded area providing objective and relevant information. After the disaster experts can use drones for mapping or remapping the affected area for making quick assessment about damages caused by the flood.

*Keywords*: flood, drone, river bed survey, aerial monitoring, quick assesment

# A SYNERGISTIC APPROACH IN DETECTION OF $NO_2$ USING MAX-DOAS AND ZSL-DOAS OBSERVATIONS IN SOUTH-EAST OF ROMANIA

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## ABSTRACT

In this work, we present the capabilities of a new MAX-DOAS (**M**ulti **AX**is **D**ifferential **O**ptical **A**bsorption **S**pectroscopy) instrument “2D U-DOAS” based on experiments performed in Galati on 2017. The 2D scanning instrument was developed at Dunarea de Jos University of Galati and uses an Avantes UV-Vis spectrometer to perform observations. We present the potential of the device to study the apparent tropospheric profiles of $NO_2$ using two scanning modes: EAM (Elevation Angle Mode) and AAM (Azimuth Angle Mode). The first experiments and the scanning sequence are presented in this work. The viewing range of the instrument and the AAM was tested and validated through a synergetic comparison with ZSL-DOAS (**Z**enith **S**cattered **L**ight **D**ifferential **O**ptical **A**bsorption **S**pectroscopy) measurements performed using UGAL mobile DOAS system. The analysis of recorded spectra was performed using QDOAS software. The results are expresed as $NO_2$ DSCD (**D**iferențial **S**lant **C**olumn **D**ensities).

*Keywords:* ZSL-DOAS, MAX-DOAS, $NO_2$, 2D DOAS scanning instrument, zenith-sky mobile DOAS observations

# A NEW TELEMETRIC APPROACH TO RETRIEVE VARIOUS ATMOSPHERIC PARAMETERS USING ADVANCED LIDAR TECHNIQUES

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## ABSTRACT

Understanding the behavior of the atmosphere and calculating its parameters is a matter of significant importance, as their constant fluctuations affect life on a day to day basis and every aspect of society on an intimate level. However, obtaining these atmospheric parameters at any given time or altitude above ground level is a difficult process, requiring either the use of meteorological balloons (which can prove a costly endeavor if done continuously), or calculation through theoretical models. Any such determination of atmospheric parameters through theory is uncertain, due to the turbulent nature of the atmosphere, and the quasi-chaotic nature of turbulent flow itself. We are putting forth a novel method for calculating many of the turbulence and pollution-associated atmospheric parameters, based on experimental data obtained with the elastic LIDAR platform of the Atmosphere Optics, Spectroscopy and Lasers Laboratory (LOA-SL) of the Faculty of Physics in the "Alexandru Ioan Cuza" University of Iasi. The vast amount of data obtained is processed using software we developed in Python 3.5, which yields the normalized mean square of the Range Corrected Signal (RCS) intensity; using it to calculate the profile of the structure coefficient of the refraction index $C_N^2(z)$, we are then able to determine the profiles of inner and outer scales of atmospheric turbulence $l_0(z)$ and $L_0(z)$ , along with the Reynolds number profile, which help characterize atmospheric turbidity. The $C_N^2$ profile is also used to calculate quantities important in astronomical studies, namely the Fried parameter $r_0$, the associated astronomical "seeing", and the atmospheric refractive index profile $n(z)$. Finally, correlating sun-photometer data (obtained from our AERONET platform in Iasi) with RCS profiles, we are able to approximate the aerosol LIDAR ratio, and thus solve the Fernald-Klett inversion to obtain the total and aerosol backscatter profile $\beta(z)$ and $\beta_a(z)$.

# OVERVIEW OF TROPOSPHERIC $NO_2$ USING OMI OBSERVATIONS OVER THE WORLD

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## ABSTRACT

In this study we present the assessment of air pollution over the last ten years caused by the first five most polluting countries from each continent according to WHO (**W**orld **H**ealth **O**rganization) and Numbeo - the world's largest database of user contributed data about cities and countries worldwide. Another direction of this study is to evaluate the NO2 spatial variations that occur in each season above the studied countries. The evolution of NO2 pollution worldwide was acquired using long-term observation of the space-borne instrument OMI (**O**zone **M**onitoring **I**nstrument). The satellite OMI instrument performs daily global cover measurements of NO2 using nadir DOAS (**D**ifferential **O**ptical **A**bsorption **S**pectroscopy) observations at a spatial resolution of 13x24 $km^2$. Nitrogen dioxide data was extracted from OMI observations using GIOVANI v 4.24 (**G**eospatial **I**nteractive **O**nline **V**isualization and **AN**alysis **I**nfrastructure) and represents the 30% cloud screened tropospheric vertical column densities of NO2 integrated on a surface of a binned pixel 25x25 $km^2$.

*Keywords*: NO2, satellite observations, OMI, seasonal variation, GIOVANI

# DRINKING WATER QUALITY FROM PRIVATE WELLS IN TWO RURAL COMMUNITIES FROM CLUJ AND BISTRITA-NASAUD COUNTIES – ROMANIA

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## ABSTRACT

In Romania, there are rural areas where the access to safe drinking water sources is still an unsolved issue. The main objective of the present study was to assess the quality of several underground drinking water sources from two rural communities from Romania and to evaluate the suitability of using those water sources in drinking and agricultural purposes. The investigated parameters were: pH, redox potential (Eh), electrical conductivity (EC), total dissolved solids (TDS), salinity, 13 dissolved ions (F-, Cl-, Br-, NO2-, NO3-, PO4-3, SO4-2, Li+, Na+, NH4+, K+, Mg2+, Ca2+) and 8 metals (Fe, Zn, Cr, Cu, Cd, Ni, Pb and Mn). The analyses indicated high levels of sulphates (up to 353.2 mg/l) in the wells from Cluj County and high concentrations of nitrates (up to 111.4 mg/l) and nitrites (up to 1.5 mg/l) in the wells from Bistrița-Năsăud County, these parameters frequently exceeded the safely limits imposed by national and international legislation. The levels of the other investigated parameters were generally below the maximum limits imposed by national and international legislation. Based on the sodium adsorption ratio (SAR) and sodium percentage (SP) values, most of the investigated water sources can be safely used in agriculture purposes.

*Keywords*: rural communities, heavy metals, water quality index, sodium adsorption ratio, drinking water ethics

# EVALUATION OF AIR QUALITY FROM MEASUREMENT CAMPAIGN ORGANISED IN THE CROSSING OF PODUL DE PIATRA – IASI CITY, DURING FEBRUARY 2018

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## ABSTRACT

SC INOESY SRL and Grimm Aerosol Technik Germany have organized an air quality monitoring campaign [PM10, PM2.5 and PM1] in Iasi city, Stone Bridge (Podul de Piatra) area [47.158027N, 27.575467E] in the period of 8 to 22 February of 2018. The chosen location is nearby (150 m) the APM-IS-01 monitoring site of the National Environmental Protection Agency. A daily comparison of the PM10 mass concentrations measured by the EDM164 instrument and APM-IS-01 data (www.calitateaer.ro) was made. The recorded values have a Pearson correlation of 0.6 that indicate approximatively 40% of daily values variance. Moreover, the variability of the PM values is given both by the speed and wind direction and that the EDM164 station was located about 80 meters from the centre of the crossing of the Stone Bridge. The wind direction was from the North-East sector too, in 5 out of the 15 days, favouring the APM-IS-01 to record slightly higher values than the EDM164 station. The EDM164 recorded that the PM10 daily averages exceed the 50 $\mu g/m^3$ thresholds in 12 out of 15 monitoring days. In addition, the PM10 hourly average exceed in 65% of the time (228 hours with PM10 higher than 50 $\mu g/m^3$) during the monitoring campaign. APM IS-01 station recorded PM10 daily averages above 50 $\mu g/m^3$ in 7 days and PM10 hourly averages higher than 50 $\mu g/m^3$ in 42% (149 hours) of the time during the same period. The hourly average of PM10 concentrations during this period was due to the increasing of the PM2.5 and PM1 concentrations (80% of cases), most likely due to the combustion of solid and liquid fuels used in urban transport and heating, respectively. Furthermore, the contribution to increasing the PM10 concentration due to larger particles with sizes between 2.5 and 10 μm (20% of hourly averages) most likely was caused by the air resuspension of the drying of moisturized road dust settled on the ground by rainfall. The main sources in this case are due both to urban sites and to the development of residential areas around Iaşi, where the streets are not totally paved.
These types of pollution will contribute significantly in the immediate period [March to April] due to the specific climatic reasons, in addition to fine particles already growing. Thus, restricting car traffic in major intersections by facilitating public transport may become necessary. Free shipping routes within certain times will be came necessary. These can be established by creating a mobile 2D and/or 3D monitoring network of the main pollutant compounds.

*Keywords*: air quality, mass concentration, PM

# THE PERFECT POLLUTION: AN OVERVIEW OF THE CONCEPT AND APPROACHES TO EVALUATING OF IRREVERSIBLE URBAN DEVELOPMENT. A CASE STUDY.

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## ABSTRACT

In the last years in the Stone Bridge (Podul de Piatra) area [47.158027N, 27.575467E] district of Iasi the limit daily values of suspended particulate matter of PM10 being more and more common attracted the attention of air pollution researches. Depending on the pollution sources, the exposure time and the meteorological parameters the pollutants can be captures at the ground-level for a few days. According to literature this area is characterized as a heat island.

Iasi City was erected in North-East part of Romania, at the end of the XIV$^{th}$ Century, on the margin of the Bahlui River, more specifically on the conjunction of two important transcontinental commercial roads which brought together the Baltic Sea with the Mediteraneean Sea and the Central Europe with the North of the Black Sea. Due to the advantages given by the geographical position, the city became the capital of Moldavia at the end of the XVI$^{th}$ Century. In the Middle Age the Bahlui River was retained with a great wall of stone. Thus, the Bahlui valley was flooded and transformed into a lake serving the purpose to protect the city from three different directions. In the XIX$^{th}$ Century the local authorities began the drainage of Bahlui valley and enclosing wet land. In this area, at the city periphery from back then, workshops and factories were build. The National Road was also established there in order to divert the heavy traffic. In 1840 a bridge was built over Bahlui made out of stone, lime mortar and iron.

The developments of industrial activities and of the road and railway transport were the main focus on the Bahlui margins until the Second World War (WW II). After WW II, around Bahlui River were build several residential areas. The industrial activities were relocated, but the heady traffic (road as well as railway traffic) were not, which led to an intense pollution of the area.

In the meantime, this area has experienced a series of environmental conditions that allow us for a preliminary discussion on a new concept in the field of Science and Environmental Protection: *"the Perfect Pollution of Ambiental Air"* in a delimited urban area.

Thus, the paper proposes an interdisciplinary analysis of some researches from the last years, referring to the most requested intersection in Iasi: Stone Bridge road node.

This landmark has undergone a series of urban transformations since the second half of the XIX$^{th}$ Century up to the present time. Sustainable and eco-friendly solutions are difficult to find under current conditions

which requires a new approach for irreversible urban development. Approaching of a possible sustainable transformation of this area by re-capitalizing on the historical monument underlying the whole issue will be presented in this study. Thus, the old Stone Bridge (built in the 1850s) can be reintroduced into the urban circuit by local action to encourage tourism as a "*historical monuments consumer*". This study will support the scientific definition of a new concept: *"the Perfect Pollution"*, as it is necessary to study in detail also the issues of soil pollution (totally transformed anthropically), the water (Bahlui River), the noise (increasing auto and rail traffic) and the entire microclimate of the studied area.

*Keywords*: the Perfect Pollution of Ambiental Air, Irreversible Urban Development

# NOTES ON THE DEVELOPMENT OF NATIONAL RADON ACTION PLAN IN SPAIN

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## ABSTRACT

The last COUNCIL DIRECTIVE 2013/59/EURATOM of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom, included for the first time exposure to radon in various scenarios as a exposure situation which have to be under control. The implementation of this Directive should be done by february 2018 into the national legislations of all the European member states. In particular, in the Annex XIII the list of principal items this should be taken into account in the design of a National Radon Action Plan, are listed. In Spain, all of these topics are developed on a different extent. In this presentation, a brief summary of the situation of the Spanish Radon Action Plan, together with some outcomes, will be showed.

# ESTABLISHMENT OF ASSESSMENT OF A METHODOLOGY FOR A FUEL GENERATED FROM DEGRADED MATERIALS FROM LANDFILLED MUNICIPAL SOLID WASTE

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## ABSTRACT

The paper was generated by an existing reality in the inadequate ways in which municipal waste is managed in Romania, which, despite all the institutional efforts, did not eliminate their procedures and their effects. The big problem arises from the fact that there is no selective collection and treatment at pre-established levels, municipal waste is stored in the mixture, which leads to a degradation of the component materials. The objective of the research is determined by the finding of a solution for their recovery, in the absence of material valorization. The solution found calls for an attempt at energy recovery, by substantiating a methodology for assessing the potential of component materials within a generated fuel. It is based on the following steps: determining the composition of municipal waste and characterizing it; determining the composition of the generated fuel from the municipal waste material components; studying elements of fuel characterization generated (determination of moisture and ash content, determination of volatile matter content, determination of chlorine and nitrogen content, determination of calorimetric amount); comparative analysis of generated fuel characterization results generated with other types of fuel; conclusions on the ways of capitalizing the degraded materials within the municipal waste. The novelty consists in studying the quantities and effects of introducing a calorific boosting agent of "generated fuel" in order to exceed the values obtained at biomass, wood and lignite briquettes. The case study for the experimental consolidation of the methodology is done for the waste management situation at the "Urban waste landfill site in Doba, Satu Mare County, Romania".

*Keywords*: municipal solid waste, energy recovery,

# SLIDEPREDICT - A PLATFORM FOR FORECASTING NEAR REAL-TIME LANDSLIDE OCCURRENCE LOW COST USING WEATHER FORECAST SYSTEMS

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## ABSTRACT

Weather forecast platforms provide, in a very simple manner, information about local meteorological conditions at hourly, daily and weekly intervals. The way this information is accessed is either by a phone application or by using an API. By using APIs from various weather forecast platforms, we aimed to build a platform that is forecasting landslide occurrence in near real-time. The system is based on ArcGIS Enterprise and various machine learning solutions. Other technologies used in the platform are Python, JavaScript and NodeJS.

The platform we built is using background processes, written in Python, to continuously train the system based on the past landslides occurrences and to forecast landslide hazard for the next day next week. The main explanatory factors are terrain properties, lithology and local meteorological conditions provided by the weather forecast platforms. Visualization of the landslides hazard is made using a 2D/3D WebGIS application, developed with ArcGIS JavaScript API that can be accessed from desktops and smartphones. Because data provided by each weather forecast system is different, an estimation of the landslide hazard prediction uncertainty is provided. The platform was trained using 2157 landslides occurrences collected by the General Inspectorate for Emergency Situations during the Ro-Risk project.

# ADVANCED QUANTITATIVE ENVIRONMENTAL ASSESSMENT

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## ABSTRACT

Environmental assessment is a procedure that ensures that the environmental implications and impacts of decisions are taken into account before the decisions are brought. Environmental assessment can be carried out for projects, such as a power plants, highways, waste disposal facilities or industrial plant on the basis of Directive 2011/92/EU (known as 'Environmental Impact Assessment' – EIA Directive). The objective is to ensure that plans, programmes and projects likely to have significant effects on the environment are made subject to an environmental assessment, prior to their approval or authorization.
The methodology and the methods to be used in the field of environmental impact assessment is wide including GIS techniques, interaction matrices, questionnaires, MCDM methods, etc.
The purpose of this paper is to devise a quantitative type of water quality assessment method which could provide rapid, accurate, and reliable information on the quality of the surface waters by using water chemistry parameters. Quality classes have been defined for every water chemistry parameter in light of the legal limit values of the water parameters. In addition to this, weight indices were calculated on the basis of the outcome of the paired comparison of water chemistry parameters and normalized matrix. This was followed by the parametric level analysis of the water chemistry parameters, and finally, the aquatic environment index (AEI) was calculated, which provided general information on the quality of water regarding the water chemistry parameters.

*Keywords*: Surface water chemistry parameters, water quality assessment, aquatic environment index

# ASSESSMENT OF HEAVY METAL POLLUTION IN AN URBAN ENVIRONMENT BASED ON THE URBAN PUDDLE SEDIMENT SURVEY

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## ABSTRACT

Natural processes cause sedimentation in local surface depressed zones of the urban landscape with the formation of micro water bodies (puddles). The urban puddle sediments are the geochemical trap of the contemporary technogenic and anthropogenic sediments. Accumulation of pollutants over space and time is an advantage of urban sediments in comparison with urban soils. The assessment of heavy metal pollution of an urban environment was conducted for different cities based on the study of the urban puddle sediments. Samples of urban puddle sediments were collected in residential areas of the cities in Russia: Tyumen (43 locations), Chelyabinsk (60), Nizhniy Tagil (69), Magnitogorsk (41), Perm (5) and Ufa (43). These cities are situated in different natural regions, territories with different geological structure, and in different industrial zones.

Heavy metal content, pH level, organic matter content and particle size composition was determined for the samples. The following results were obtained:

- the anthropogenic and natural geochemical associations were identified for the cities;
- the geochemical baseline values for metals were assessed for the territories of the studied cities;
- the pollution index was calculated for the cities.

*Keywords*: puddle sediments, heavy metals, pollution, urban environment, environmental assessment

# EXPERIMENTAL STUDY OF MIGRATION AND ACCUMULATION OF HEAVY METALS IN CONTEMPORARY SEDIMENTS IN URBAN ENVIRONMENT

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## ABSTRACT

The mechanisms of forming the urban surface mud sediment and its pollution with heavy metals were studied. The study was conducted on the example of Ekaterinburg (Russia). Surface mud sediment at the residential territories can be classified as the geochemical trap of the contemporary anthropogenic sediment. The analysis of 30 samples of surface mud sediment, soils and ground was conducted. Samples of the environmental compartments were collected at the territories of six blocks of houses located in various parts of the city and at the various geological units. Five samples were collected in each block at the different landscape zones: 3 samples within the block (at the green zone, at the parking lot and at the footpath) and 2 samples â€“ outside (surface dust at the road and ground at green zone). Particle size composition was determined for the samples. The content of Pb, Zn, Cu, Ni, Co, and Mn was measured in particle size fractions of the samples. Particle size composition of the surface mud sediment in Ekaterinburg is similar to the particle size composition of the grounds formed on the sediments of Holocene age in Urals region. The positive statistically significant correlation was found between the couples of metals: Zn and Pb, Zn and Cu, Co and Ni. The distribution of concentrations of Pb, Zn and Cu over particle size fractions of surface mud sediment is heterogeneous. Pollution of the ground and soil in urban areas is due to the transition of heavy metals with particles of dust and fine sand. Typical geochemical association of metals for particle size fraction of surface mud sediment 0.002-0.01 mm â€“ Mn-Zn-Ni-Cu-Pb-Co, that is similar to the association for sediments of surface puddles in local zones of relief, soils and bottom sediments at the city territory.

*Keywords*: contemporary anthropogenic sediments, surface mud sediment, particle size composition, heavy metals

# RADON MEASUREMENTS IN ENVIRONMENTAL FACTORS (WATER, SOIL AND AIR) FROM TIMIȘOARA COUNTY, ROMÂNIA

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## ABSTRACT

As a radioactive decay product from rocks, in natural conditions, radon is a source of radiation for the population. Radon is a radioactive noble gas of natural origin that may be found anywhere in soil, air and in different types of water: surface, wells and springs.
The first step to prevent the risk of exposure to radon is to identify the sources and find the appropriate mitigation method. Once formed by the disintegration of heavy elements in the Earth's crust, radon diffuses into the soil and water, and then it is transported to the atmosphere. It is recommended carrying out surveys for radon in natural water and indoor air for radiation protection as well for geological considerations.
The results presented in this paper are from a survey carried out in Timisoara County, Romania, for radon concentrations in water, soil and indoor air. The measurements were made using a LUK-VR system based on radon gas measurements with Lucas cell for water and soil and with track detectors based on CR-39 for indoor air.
The results show that the radon concentrations are within the range of 0.9 to 68.9 Bq $l^{-1}$ with an average value of 9.5 Bq $l^{-1}$ for all types of water covered within this survey. Radon concentrations in soil range between 12 kBq $m^{-3}$ to 95 kBq $m^{-3}$ with an average of 34 kBq $m^{-3}$. The indoor radon concentrations range from 47 Bq $m^{-3}$ to 1238 Bq $m^{-3}$ with an average of 281 Bq $m^{-3}$.

*Keywords*: radon, water, indoor radon, soil, geologic.

# AN APPROACH TOWARDS HUMAN HEALTH RISK ASSESSMENT OF PESTICIDE RESIDUES IN APPLES

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## ABSTRACT

During the vegetation cycle, apples can be affected by diseases or/and pests, which can lead to the complete destruction of the cultures. As a common practice, farmers apply several treatments during the phenological growth stages, at recommended single doses or double doses, causing fruits and vegetables contamination with pesticides. Our work is focused on a risk assessment strategy using Pesticide Residue Intake Model (PRIMo Tool) elaborated by EFSA which evaluates the human health effects of different treatments with pesticides (e.g. chlorotalonil, miclobutanil, folpet, tebuconazole, captan, triadimenol, deltamethrin, alpha-cypermethrin, lambda-cyhalothrin, chlorpyrifos-methyl, bifenthrin or propargite) applied in apples in recommended single doses or double doses. Modeling risk assessment of pesticides residues in apples showed that propargite applied in recommended single dose can pose an acute risk for both children and adults, while tebuconazole and lambda-cyhalothrin can pose an acute risk for children. The acute intake values may vary between 3.5 and 1209.9 % ADI (Average Daily Intake) for children and between 0.7 and 277.1 % ADI for adults. When considering double dose treatments, the values of short-term intake for children related to pesticides tebuconazole, propargite, folpet, chlorpyrifos and bifenthrin are between 103.4 and 1699.7% ADI, while for adults the values of short-term intake for all pesticides are between 3.0 and 389.2 % ADI. The results related to the chronic risk show that children are the most affected category compared to adults, while risk is much higher when consumption of apples treated with double doses of pesticides is considered.

*Keywords*: apples, pesticides, PRIMo Tool, risk assessment

# ENVIRONMENTAL- EMBODIED EDUCATION: VIRTUES FOR SOCIAL HYGIENE AND SELF- ENJOYMENT

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## ABSTRACT

The contemporary debates concerning environmental education and ethics are continuously growing, developing new ways of perceiving the self in relation to the biotic community and to nature as a whole. Sustainability virtue ethics is a field that can provide a theoretical and practical structure for what it means to live a good and pleasant life, building attitudes characterized by caring, awareness, awe and responsibility. The aim of this paper is to draw a map of how to generate a context that facilitates a real transformation in the way individuals relate to nature, an education for empathy, with a sense of belonging and a maximum of adaptability. Based on my experience as an educator in a Green School and as a researcher in the field of moral eco-pedagogy, I intent to talk about how environmental experiential education is an Archimedean point for what it means to develop a sensuous enjoyment and self-enjoyment in the biotic community, moving away from defensiveness and unjustified fears. This paper is designed to stand up against the instrumentalism and the dominant egoistic attitude of being above nature, trying to replace them with the attitude of fitting into nature with curiosity, simplicity and serenity. Using the model of moral eco-pedagogy (experiential learning about, for and from the environment) and non-violent communication, I will show that the individual begins to become that self that one truly is, a process of self- realization and engagement with an impact on how he relates to the moral patients and the natural world.

*Keywords*: education, ethics, embodied, virtue, sustainability, outdoor

# ENVIRONMENTAL LEGISLATION AND CULTURAL DIVERSITY

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## ABSTRACT

Environmental Legislation in the African Contest. With the case study of Cameroon with over 300 hundred ethnic groups, implementing an environmental legislation to meet up with all the various socio-cultural diversities in the Cameroon context is a bone of contention.
Respecting cultural values and ethnic environmental rights in face of environmental reforms with changing trends.

*Keywords*: Cultural Diversity and Environment

# PREPAREDNESS OF CRITICAL INFRASTRUCTURES FOR EXTREME EVENTS

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## ABSTRACT

Critical Infrastructures play a crucial role in the continupus performance of economy and society during and after extreme events. Over the last few decades the number and variety of infrastructures has grown rapidly, and the interdependency between them has increased. More and more essential services depend on the continuous performance of one, two or even more critical infrastructures such as power supply, transportation, communications, etc. It is therefore critical to ensure reliable and robust performance of critical infrastructures on a continuous basis, particularly in the face of extreme events. A state-of-the-art review of the contemporary state of preparedness of critical infrastructures is introduced, through a comprehensive literature review of significant extreme events that occurred in the past two decades. An effort to identify the common denominators between the different extreme events is discussed in order to universalize the discussion and thought-provoking conclusions on the present conditions of critical infrastructures and their implications in terms of preparedness, risk assessment, and disaster management. A Probabilistic Seismic Hazard Analysis (PSHA) approach is introduced in order to reflect a variety of possible seismic scenarios and mitigate the uncertainties regarding the timing, the location, and the magnitude of an earthquake. This approach provides novel analytical and decision-support tool that integrates between the components adjusted fragility curves in the risk assessment and the consequent mitigation step; the optimal mitigation strategy is derived from the fragility parameters reflection on the total risk function. An innovative lifecycle assessment (LCA) framework is intruduced that can incorporate building damage due to hazards and convert these data into quantifiable environmental metrics. Moreover, by incorporating buildings' environmental impacts attributable to hazards as derived from the LCA framework, a benefit-cost analysis (BCA) is achieved to justify the environmental desirability of hazard mitigation actions.

*Keywords*: Extreme Events, Critical Infrastructures, Damage Assessment, Life Cycle Assessment (LCA), Natural Hazards, Preparedness, Risk

# RISK ASSESSMENT FOR HISTORICAL DAMS AT ROȘIA MONTANĂ

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## ABSTRACT

The Roşia Montană ponds are accumulations made for the water supply for stamping, hydraulically operated installations, used since the Romans to crush the ores. Many of these lakes, in operation today, are made by dams which are a model of past engineering conception and are representative for many other constructions in Transylvania. But because of their age and lack of adequate maintenance for a long period of time, these dams can pose a significant risk to downstream localities. What risk does these works have at present?
The paper briefly describes the main still operating ponds and their dams from Roşia Montană, with their technical characteristics and how their risk was calculated according to the current technical stipulations.
The content of the paper presents the current state of these works, as well as the measures necessary for their safe operation, measures established in such a way to preserve their architectural and technical value.

*Keywords:* ponds, historical dams, risk, risk assessment, safety measures.

# FLOOD RISK MANAGEMENT CASE STUDY ON THE APPLICATION OF MEASURES IN THE SOMES-TISA WATER CATCHMENT

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## ABSTRACT

Currently Romania is in the process of implementing the stipulations of the Floods Directive 2007/60/EC and the implementation of flood risk management plans on hydrographic basins. The main objectives of flood risk management are to protect human lives, reduce economic losses, protect the environment and cultural heritage.
By using flood risk and hazard maps, there has been identified 37 areas of potentially significant flood risk (A.P.S.F.R.) in the Somes-Tisa water catchment.
This work handle briefly the main measures foreseen in the Flood Risk Management Plan in the Someş-Tisa water catchment and the major proposed projects.The content of the paper details these proposals, emphasizing their necessity and opportunity and their effects, especially those of mitigation of flood waves.

*Keywords:* Flood Risk Management Plans, objectives, measures, flood, major projects, prioritys.

# LEVELS OF INDOOR RADON CONCENTRATION IN SCHOOLS: CASE STUDY IN SCHOOLS IN THE NORTHEASTERN THAILAND

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## ABSTRACT

Radon is a human carcinogen and a serious public health problem. High radon inhalation for long periods can increase the risk of lung cancer. There are many studies in Thailand focused on the hazard posed in the home. However, no report of the level in school for children. Children have been reported to have greater risk than adults for certain types of cancer from radiation and children spend much of their time at school next on down their home. In this study, indoor radon concentrations from 20 schools in the Northeastern of Thailand were measured by solid state nuclear tract detectors (SSNDTs), using CR-39 detectors in closed cups, by a short-term test (90 days). Radon cups were placed in the classroom for 7 cups per room. Radon cups were placed only in the kindergarten classroom and the classroom in contact with the ground. The indoor radon concentrations (Bq/m3) and annual effect dose (mSv/y) were calculated from the measured track densities using the radon calibration factor. The calibration factor was carried out using CR-39 detectors in closed cups at Radon laboratory at Thailand Institute of Nuclear Technology (TINT). The results showed that indoor radon concentrations were in the range of 14-165 Bq/m3 with an average value of 32 Bq/m3, but around 5 % of all schools, indoor radon exceeded the safety limited (148 Bq/m3) of recommended by US Environmental Protection Agency (US EPA). Annual effective dose were in the rage of 0.35-4.16 mSv/y with an average value of 0.80 mSv/y, around 9 % of all schools, annual effective dose exceeded the annual dose limit (1 mSv/y) for the general public regulated by International Commission on Radiological Protection (ICRP). Radon concentration and annual effective dose values were also compared with levels of radon in schools in other countries. These data were taken as part of radon mapping in Thailand.

*Keywords*: Indoor Radon, School, Children, Annual effective dose

# GRAPHENE-BASED STOCHASTIC MICROSENSORS AS TOOLS FOR SIMULTANEOUS RECOGNITION OF NITRITES AND NITRATES IN WATER SAMPLES

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## ABSTRACT

Two stochastic microsensors based on graphene powders and protoporphyrin IX, were proposed for the simultaneous assay of nitrite and nitrate in water samples. The proposed microsensors can provide a fast screening of water samples with a qualitative and quantitative analysis for NO2- and NO3- at very low concentrations. The linear concentration range were wide – covering clean as well as polluted waters, and the limits of determination reached by the microsensor made possible the simultaneous assay of both ions at very low concentration levels in water samples.
The results provided by the stochastic microsensors were in agreement with those obtained by utilization of standard methods, recoveries higher than 99.00% and RSD lower than 1.00% proving that the method can be reliable used for simultaneous assay of NO2- and NO3- in any type of water sample.

*Keywords*: nitrite, nitrate, water sample, stochastic sensors, graphene, protoporphyrin IX etc

# ESTIMATION OF MIXING LAYER HEIGHT USING VAISALA CL 31 CEILOMETERS

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## ABSTRACT

Atmospheric pollutants are dispersed within the mixing-layer (ML) and thus mixing-layer height (MLH) is an important parameter for air quality applications. Therefore, the aim of this work is to investigate whether the remote sensing equipment, CL31 Väïsälä ceilometer can successfully reproduce the general MLH pattern at two different sites - Magurele (44.38 N and 26.029 E, near Bucharest) and Strejnic (44.55 N and 25.57 E, near Ploiești). Ceilometer's major advantage is that it measures continuously and over a large vertical range. The study used the coincident daily measurements for year 2017. The values of MLH were compared with those derived from radio-soundings, obtained using Hysplit soft and validated by the method based on the bulk Richardson number approach for atmospheric stability conditions.

# ENVIRONMENTAL PROTECTION OR SUBVERSION IN MINING? PLANNING CHALLENGES, PERSPECTIVES AND ACTORS AT THE LARGEST GOLD DEPOSIT IN EUROPE

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## ABSTRACT

The gold ores in Roşia Montană have been intensely mined for the last two thousand years, as this mining district was one of the richest gold deposits in the Apuseni Mountains (the so-called Golden Quadrangle of Romania) and currently considered the largest gold deposit in Europe. Up until a few decades ago, gold mines had a relatively predictable path, which began with exploration and ended with abandonment. This has since changed, once the impact of abusive past or current exploitation methods and technologies has been deemed unacceptable by the state and the public. With its millennia-old history of mining, Roșia Montană raises the intriguing question of what does the future hold for different actors in a situation that is clearly unsustainable, but which may be continued through environmental rehabilitation, or even a larger mine. We address the question for this particular mine by drawing on a worldwide database of similar cases contained in the Environmental Justice Atlas (EJAtlas). We consider three scenarios, namely: 1) continued degradation with no intervention; 2) approval of large-scale mine, due to international arbitration; 3) environmental rehabilitation. These capture the most plausible future scenarios of the Roșia Montană case and, by relating them to the relevant transnational environmental justice context, we aim to assess their implications for different actors and also the extent to which they are illustrative for the fate of other mines worldwide. Mine closure and the rehabilitation of the environment, however distant they may seem at the beginning of the prospection and extraction stage, are imminent in the mine life cycle and a mandatory step of the environmental management process. We conclude by suggesting under which governance regimes each scenario is likely to unfold and what implications can be drawn for public policy.

*Keywords*: planning perspectives, mining conflicts, social actors, Environmental Justice Atlas, Roşia Montană.

# SATELLITE BASED MONITORING INITIATIVE FOR REGIONAL AIR QUALITY (SAMIRA)

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## ABSTRACT

A vast amount of satellite-based Earth Observation (EO) data are available, many of which have the potential to be useful for air quality applications. In order to exploit these data, a three-year ESA funded project Satellite based Monitoring Initiative for Regional Air quality (SAMIRA) started in 2016. The overall goal of SAMIRA is to improve regional and local air quality monitoring through synergetic use of satellite data, data traditionally used in situ air quality monitoring networks, and output from chemical transport models. Through collaborative efforts in four countries (Poland, Romania, The Czech Republic, and Norway) with different, but pressing air quality problems, SAMIRA aims at supporting the participating institutions and associated users in their national monitoring obligations as well as to generate new research in this area.

Here, we present an overview of the project and initial results. Six core activities are being carried out in order to achieve the main goal: Firstly, the project is developing and optimizing algorithms for the retrieval of hourly aerosol optical depth (AOD) maps from the Spinning Enhanced Visible and InfraRed Imager (SEVIRI) onboard of Meteosat Second Generation. Secondly, SAMIRA aims at deriving particulate matter ($PM_{2.5}$) estimates from aerosol optical depth (AOD) data by developing robust algorithms for AOD-to-PM conversion with the support from model- and lidar data. The Weather Research and Forecasting (WRF) model coupled with Chemistry (WRF-Chem) is run on a 5 km x 5 km grid for Europe and on a 1 km x 1 km grid for the capitals of the four countries, Gorj County in Romania, and Silesia Region, especially along the border area between Poland and The Czech Republic, which periodically suffers from air pollution. In a third activity, we evaluate the added value of satellite products of atmospheric composition for operational European-scale air quality mapping using geostatistics and auxiliary datasets. The additional benefit of satellite-based monitoring over existing monitoring techniques (in situ, models) is tested by combining these datasets using geostatistical methods and demonstrated for nitrogen dioxide ($NO_2$), sulphur dioxide ($SO_2$), and aerosol optical depth/particulate matter. As a fourth activity, the project is developing new algorithms for downscaling coarse-resolution satellite products of air quality with the help of high-resolution model information. This will add value to existing earth observation products of air quality by bringing them to spatial scales that are more in line with what is generally required for studying urban and regional scale air quality. In a fifth activity, we implement robust and independent validation schemes for evaluating the quality of the generated products. Finally, in a sixth activity the consortium is working towards a pre-operational system for improved PM forecasts for each of the specified domains using observational (in situ and satellite) data assimilation.

# THE SHADOW OF “GREAT EARTHQUAKE” AND SUSTAINABLE BUCHAREST. SHARED RESPONSIBILITIES AND DISASTER RISK MANAGEMENT

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## ABSTRACT

Bucharest is located in Romania’s most active seismic area. In the past, the city has been significantly affected by a few earthquakes, including the 1977 one, which was one of the strongest and made the largest number of human and material victims. The concentration of population, and of old or high buildings in Bucharest, makes living with high seismic risks one of the most important economic and socio-demographic vulnerabilities of the Romanian capital. The shadow of the great earthquake is constantly present in Bucharest in debates and public actions, but the operationalization of disaster risk management measures are not yet the best example in terms of implementation actions. The research presents a critical assessment of regulatory and operational measures used to identify vulnerable seismic buildings, the responsibilities of the public and private stakeholders involved, and the way in which each of latter assumes and implements the first. The data and results were obtained within the "Alert - Seismic Risk Awareness Project - www.seismic-alert.ro", initiated by MKBT: Make Better and implemented with the Romanian Centre for Innovation in Local Development..

*Keywords*: sustainable Bucharest, earthquake, urban policies, disaster risk management, shared responsibilities, civic action

# EXTRACTION OF LEAD FROM POLLUTED SOILS

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## ABSTRACT

This paper shows laboratory researches in order to extract lead from the polluted soils. Research is based on preliminary studies regarding the usage of microorganisms for decontamination of soil polluted with heavy metal (Pb). Soil samples used in the experimental research were taken from an area polluted with heavy metals from Romania. The soil samples are subjected to the cleaning process using the 9K medium extraction solution, stirred 200 rpm for 24 hours at a controlled temperature (30 °C). During the experiment (0, 6, 12, 18 and 24 h), liquid samples have been extracted and analyzed using the Atomic Absorption Spectrophotometer AA–6800 (AAS) in order to determine the Pb concentration. Experiments led to the conclusion that these soils can be depolluted by bioleaching, being a biological treatment method involving the use of microorganisms to favor the extraction of lead from polluted soils.

*Keywords*: 9K medium; bioleaching; lead, soil polluted.

# SURVEY OF INDOOR RADON DISTRIBUTION IN RESIDENTIAL AND PUBLIC BUILDING FROM CLUJ-NAPOCA METROPOLITAN AREA

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## ABSTRACT

Radon and its decay products are the most important sources of natural radiation for the human exposure. As the second cause of lung cancer (after smoking), radon is received indoors, in houses and others buildings by the majority of the population exposed. (ICRP, 1993). In the past decades, systematic radon surveys in dwellings were carried out all over the world (UNSCEAR 2000). Almost half of the radioactive dose is due to radon gas.
The radon requirements in the new Euratom Basic Safety Standards Directive include the establishment of a national reference level for indoor radon concentration in workplaces and public buildings ≤ 300 Bq/m$^3$. Although research on indoor radon concentrations in dwellings is actively conducted in Romania, systematic surveys in public buildings are still lacking.
The objective of this present study was to study aims to determine the distribution of indoor radon in schools and kindergartens from Cluj-Napoca, in comparison with the radon concentration levels in dwellings from the same region, and to analyze the main factors affecting indoor radon levels.
Indoor radon measurements were performed by using CR-39 passive detectors (RSKS type; RadoSys Hungary).
A comprehensive radon survey has been carried out in 2015 in 63 schools and kindergartens located in Cluj-Napoca area. The results in these high occupancy public buildings were compared with the indoor radon levels obtained for 280 dwellings in the frame of SMART_RAD_EN project.
The percentage for both schools and residential houses showing radon activity concentrations exceeding the recommended level of 300 Bq/m$^3$ was 11%.
Together with the detectors a questionnaire was completed in each surveyed building in order to collect relevant information about factors relating to measurement site as characterization of house, building materials, occupancy hours, indoor air quality etc. The preliminary results clearly show the need to implement mitigation actions in affected public buildings in the frame of the national radon program. In workplaces where radon concentrations continue to exceed the national reference level cost-effective actions must be taken to optimize the exposure.

*Keywords*: indoor radon, schools and kindergartens, houses.

# COULD WE DEFINE PERFORMANCE INDICATORS RELATED TO PUBLIC AWARENESS & TRAINING FOR SEISMIC SAFETY?

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## ABSTRACT

Performance indicators are essential tools used to assess and quantify the efficiency and impact of a certain action or group of actions. Public awareness, education and training as part of a seismic safety strategy should not be different, even if rarely the effort is integrated into a coherent risk reduction strategy or work have been done for defining and tracking performance indicators. The issue is far from being easily tackled in any field, even more in an area where the actions will mostly bring a medium to long term impact. The negative side of such indicators come from the tendency of oversimplifications even if behind there is a highly complex landscape of considered variables. The elements addressed by the present paper are part of the non-structural measures (mitigation elements) of a seismic safety chain and presented in relationship with their quantification at the level of a research institute actively involved in seismic risk reduction actions.

We start from quantifying the number, complexity and coherence of different initiatives in support for seismic risk mitigation, and continuing by translating the results in easily understood indicators from a qualitative scientific, technical and numerical perspective. We discuss about the impact of awareness public campaign starting from an educational perspective and going to citizen science approach. We analyze how and if school activities based on earthquake data are easily linked and understood by learners from a seismic safety perspective. We assess the importance proper define and maintain communication between important stakeholders acting in the field of disaster management (e.g: civil protection, local authorities, NGOs, mass-media).

And last but not least, we provide a view on how some of the principles of geoethics, mainly regarding the responsibility of geoscientists in service to society and the need for effective communication of geoscience information to the public, are integrated and reflected in the actions taken.

*Keywords*: public awareness, seismic safety, communication, science education, geoethics

# REGARDING THE ECOLOGICAL RESTORATION OF INDUSTRIAL SITES IN THE ACTUAL LEGAL CONTEXT OF ROMANIA

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## ABSTRACT

Following the adherence to the European Union from January 1st 2007, but also before it, Romania made significant efforts to implement the European directives including the laws from the field of environment protection.
In this context, a series of normative acts have been promulgated regarding soil and subsoil quality, ecological restoration of industrial waste disposals, a national plan regarding the management of the contaminated sites has been elaborated and a series of ecological restoration projects were started in the industrially affected regions.
Nowadays in the practice of environment protection especially in the field of ecological restoration of industrial sites affected by mining activity we notice a series of difficulties and a lack of clear legislative provisions or sectorial regulations for application and post application monitoring. The Romanian experience in the field of environment protection is at it's beginnings and follows constantly the experience of EU members.
The paper presents some results from the activity of ecological restoration of industrial sites lingeringly affected by mining activity in the context of legislation and ecologic security.

*Keywords*: ecological remediation, environmental laws, industrial site

# ROMANIAN RADON NATIONAL ACTION PLAN

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## ABSTRACT

The exposure due to radon is the biggest concern for public exposure, therefore the risks associated with radon exposure should be careful considers by countries. The Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom[1], requires to member states to develop and implement actions in order to minimise the exposure to radon.
The paper describes the individual actions and strategic directions of radon national action plan developed in order to transpose the Council Directive 2013/59/Euratom in regard with radon.
The Radon National Action Plan is structured on seven strategic directions covering: development of regulatory framework, measurements of indoor radon and development of radon map, identification of indoor workplaces and other workplaces with high exposure radon risk, implementation of prevention action in new buildings, information and awareness of public, minimisation of lung cancer risk due to radon, training and education of professionals who could be affected by exposure to radon[2].

References

[1] 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom, Official Journal of the European Union, L 199/48

[2] Radon National Action Plan, governmental decision draft.

# QUANTITATIVE MICRO-SCALE FLOOD RISK ASSESSMENT IN A SECTION OF THE TROTUȘ RIVER, ROMANIA

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## ABSTRACT

It is well known that a great part of the economic damage caused by natural hazards are related to floods. Furthermore, this trend is expected to increase due to extreme weather events associated to climate change. Another key factor that influences flood hazard and the increasing damages produced by floods is the dynamic of land use, particularly the increase of human settlements in flood prone areas. In this context the studies started focusing on comprehensive approaches of flood risk management which include not only hazard analysis, flood prevention and defence measures but also consequence analysis. In the last years more attention has been given to damage assessment, a large number of models and methodologies being developed for analysis at different scales. The damage models are using damage curves, the most common being the depth-damage curves which determine the damage caused by a particular water level. The choice of the scale depends on the aim of the study, the availability of input data and the methods that are used. The studies at micro-scale are used to optimise flood reduction measures, for land use planning and for cost-benefit analysis.
The paper focuses on the estimation of direct damages caused by 3 flood scenarios with different return periods in the section Făgetul de Sus – Ghimeş - Palanca Pass of Trotuș River, with the aim of highlighting the need of improved land use plans. The damage for three land use classes (residential building, infrastructure and agriculture) were estimated using the damage curves developed by European Joint Research Centre (JRC) as well as site specific maximum damage values. The data were processed with the help of the ArcMap 10.2 software and FloodRisk tool from QGIS software. Furthermore, the flood risk was assessed using the damage – probability curve, which associates the damage with the corresponding frequency of occurrence. The results showed that the greatest damages are registered for the residential building land use class for a flood probability of 0.001. In this case the damages reach up to 60% on the scale range of deterioration factor, the total damage value being 2 million euros. For the same hazard probability the total registered damage value for roads is 7500 euro, for railways is around 12000 euro, while for agriculture is around 84000 euro. These outcomes highlight the fact that more attention must be given to the protection measures and land use planning implemented in the residential sector regarding flood hazards. The proposed methodology can be applied for micro-scale analysis, providing quantitative results regarding the flood damage and flood risk assessment. It includes a detailed vulnerability analysis of the elements-at-risk with the aim of developing a more comprehensive approach of flood risk assessment.

*Keywords*: flood risk assessment, land use, flood damages, vulnerability, GIS.

# A COMPREHENSIVE RADON SURVEY IN SIBIU COUNTY (ROMANIA)

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## ABSTRACT

Radon and its decay products represent the most important contribution of population exposure to natural ionizing radiation, and it is classified as one of the most important risk for lung cancers. In order to indentify radon risk areas is necessary to perform systematic radon concentration measurements in all environmental factors, and to mapping the results.

First part of the present work was a study to mapping results of the residential, soil and water radon concentrations from Sibiu County (middle part of Romania, by an area of 5.432 $km^2$), based on ~220 indoor radon measurements, ~135 soil radon and ~160 water measurements. The whole map was plotted on reference grids with 10 km x 10 km resolution, where in each grid were performed on average 5 indoor radon measurements, soil radon measurements in 3 locations, and were measured radon concentrations from 3 collected water samples (from wells and springs). Indoor radon measurements were performed using CR-39 nuclear track detectors, exposed for more than 3 months in rooms of the ground floor dwellings, according to the NRPB Measurements Protocol. Soil gas radon measurements and the measurements of the water samples were performed by using the LUK3C radon detector. The results for annual indoor radon measurements show a mean value of 105 $Bq/m^3$ (maximum of 640 $Bq/m^3$). Around 3% of the investigated houses exceed the recommended value of 300 $Bq/m^3$. Soil gas radon measurements shows an average radon concentration of 26 $kBq/m^3$ (maximum of 90.4 $kBq/m^3$), classifying the area of the county of medium geogenic radon risk. Results of radon in water measurements show an average value of 13.3 Bq/L (maximum of 170.2 Bq/L).

Second part of the work present a detailed residential radon survey based on indoor radon measurements and the assessment of the indoor air quality in 161 thermal isolating houses in Sibiu Municipality. The results of annual indoor radon measurements for two rooms of the houses show a mean value of 127 $Bq/m^3$ (maximum of 633 $Bq/m^3$). Around 8% of the investigated houses exceed the recommended value of 300 $Bq/m^3$.

# STURGEON MIGRATION MONITORING ON DANUBE DELTA BRANCHES USING ULTRASONIC TELEMETRY AND DKMR-01T MONITORING SYSTEM

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## ABSTRACT

The importance of the sturgeon species conservation has conducted to the development of numerous research projects to complement and improve the current knowledge of the behavior of these species. It is well known from the literature that in the Danube River basin there are only 4 species of sturgeon (Sterlet sturgeon - Danube native species, Stellate sturgeon, Russian sturgeon and the Beluga sturgeon - migratory species that spend their entire biological cycle in the sea, migrating to the Danube for reproduction). The sturgeon anadromous migratory species are sensitive to hydromorphological changes, which is of particular importance for the monitoring of their behavior, taken into account the high importance of the Danube for navigation. Regularization of the Sulina branch and carrying out various works for maintenance and modification on the river bed along the time, as well as the precarious situation of sturgeons led to their monitoring by using the ultrasonic telemetry technique. The researches included in this study was carried out at the level of the three main branches of the Danube Delta where DKMR-01T monitoring systems were installed to monitor ultrasonically tagged sturgeons. The ultrasonic tagging of the sturgeons was carried out according to a well-established and continuously improved procedure by INCDPM Bucharest experts, so that the stress of the specimens subjected to the tagging was as low as possible. Was monitored the migration of both ultrasonically tagged adult specimens as well as some juvenile specimens belonging to the Stellate, Russian and Beluga sturgeon species coming from reproduction into the aquaculture system and launched in the Danube for the regeneration of sturgeon populations. The obtained results constitutes a unique data base at the level of the Danube River basin and highlighted which are the main migratory routes used by sturgeons for migration to and from the Black Sea in the Danube Delta area.

*Keywords*: sturgeon, Danube Delta, ultrasonic telemtry, DKMR-01T monitoring systems

# ENVIRONMENTAL RESEARCH IN A SEISMIC AREA

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## ABSTRACT

A multidisciplinary network is monitoring a seismic area from Romania, Vrancea, sitting at curvature of Carpathian Mountains. The last major earthquake here produced distant effects (Moscow, Istanbul) in 1977 with Mw = 7.4 and there is a high probability of having a similar event soon. Romania has a large seismic network and 10 multidisciplinary stations near to faults that monitoring the precursor factors in correlation with environmental conditions. A high quantity of information is stored and analyzed online and offline. A part of it is shared with EPOS - ORFEUS organization in real time. The tectonic stress generates many effects in lithosphere and atmosphere that affect the environment. Out database includes information about air ionization, radon concentration, CO2, telluric and electromagnetic fields, solar radiation, acoustic effects of explosions or microfracturing of rocks, ULF and VLF radio waves, GPS data, meteorological data, electrostatic field in air, lighting, magnetic and electric field, next to seismic records. The main goal of this monitoring effort is to help the authorities with information about risk situation and effects of climate change. The targets in research are the phenomena between the lithosphere and near surface low atmosphere, the effect of tectonic stress on the ionosphere, and the impacts of climate change. The environmental information like CO2, radon, air ionization or aerosols is valuable if it is obtained in areas where we have manifestations of tectonic stress. To assess the magnetic pollution we installed a magnetometer in the center of Bucharest but the same type of sensor works in a tunnel in Muntele Rosu (an isolated mountain area) for monitoring the geomagnetic field. The correlation of environmental factors with seismicity is a main method for analysis the precursor phenomena. Seismic prediction is not possible but a forecast could be. We have many examples of anomalies before earthquakes including animal behavior. The challenge is to generate useful information before the phenomenon occurs. For seismic event we have a EWS information network connected to authorities in real time. The next step is to introduce environmental events with large effects in our information system.

*Keywords*: environmental monitoring, radon anomalies, multidisciplinary monitoring, precursor phenomena, air ionization monitoring, radon monitoring, earthquake cumulative energy, cross-correlation

# ACTUAL AND FUTURE TOOLS FOR IMPROVING EARTHQUAKE EMERGENCY RESPONSE IN ROMANIA

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## ABSTRACT

Earthquakes are one of the most difficult natural hazards to manage by emergency situation actors – they are unpredictable, can cause widespread damage in a matter of seconds, can lead to multi-risks and to communication black-offs. Immediate response is necessary – for people caught under debris or fire outbreaks the useful time of intervention is in minutes. In Romania it is expected that a seismic event occurring in the Vrancea source, at intermediate-depths between 60 and 180 km and with magnitude greater than 7, could happen at any time. The exposure of nowadays society is much greater than it was at the time of past destructive events (on 10 Nov. 1940 or 4 Mar. 1977), and seismic vulnerability and risk is highly considerable, as the results of the recently completed Ro-Risk project show. In this context we present which are the actually implemented and coming-up tools dedicated to providing emergency responders better insights, enabling fast, focused and efficient interventions. Some of these tools are the Romanian Earthquake Early Warning System, ShakeMap, the Near-real time system for estimating the seismic damage in Romania (SeisDaRo), seismic data repositories, earthquake catalogues, crowdsourcing apps or building health monitoring systems. Each of these are not solely described through characteristic, but more important they are analyzed focusing on their roles, potential beneficiaries, applicative impact and vulnerabilities. The results of this analysis show that nowadays solutions dedicated to improving earthquake emergency response can highly contribute to risk reduction, as long as they are stable, shaped to beneficiary requirements and understood considering all inevitable uncertainties. The paper also refers to potential future developments, some of which refer to a new concept: earthquake disasters as an opportunity to collect big data for risk understanding.

*Keywords*: earthquake, emergency response, disaster management, software, Vrancea

# THE ADVANCED OXIDATION OF THE HARDLY BIODEGRADABLE COMPOUNDS FROM THE WATER BY USING CATALYTIC OZONISATION PROCESSES

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## ABSTRACT

Water pollution is the main means of impact upon the environment, because the aqueous effluents act like an efficient vector in spreading the chemical products. The endocrine disruptors (EDCs) are synthesis chemical substances that mimic the function of the hormones and, once arrived in the body, they alter the hormonal balance. The source of these endocrine disruptors is various, as they derive from synthesis products used or resulted from the most different industrial branches (chemical, pharmaceutical, plastics). These compounds get into the wastewaters and from here in the effluent by-passing the classical technological stages within the purging stations. They cannot be eliminated by conventional processes, because of their low biodegradability and of the concentration thresholds, which are below their operational capacity. The advanced oxidation processes (AOP) are in priority meant to almost fully remove the organic pollutants or to turn them into non toxic and/or biodegradable secondary products. AOP are fit for the effluents that contain non biodegradable pollutants, at a relatively low concentration, but with a major negative potential for the environment. One of the methods of generating the advanced oxidation processes is the catalytic oxidation one in the presence of active oxygen and of hydroxilic radicals. In this context, the paper sets out a functional model for an innovating water depolluting module, which uses catalytic ozonisation processes in the presence of an Al2O3 – type catalyser (support) / MexOy (active component) and in the presence of granular activated carbon. In the tested configuration, the experimental functional model is able to process up to 0.5 $m^3$ water flow rates, whereas the necessary ozone is produced by an ozone generator with the capacity adjustable in the 0-10 $gO_3$/h range. One has carried out two categories of tests and experiments regarding the functional capacity (flow rates and pressures in the system, time evolution of dissolved ozone concentrations) and the operational one of the module (the capacity of degradation for a synthetic ibuprofen solution at an initial concentration value of 100 mg/L). The tests carried out proved a good compliance with the theoretical assessments obtained by numerical simulation methods, as well as positive dynamics from the point of view of the oxidative degradation of the target compound.

*Keywords* : advanced oxidation, catalytic ozonisation, endocrine disruptors

# THE SEISMIC SIMULATOR AS AN INSTRUMENT FOR SEISMIC PREVENTION

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## ABSTRACT

Understanding the seismic phenomena and it's impact over costructed sites resembles the fundamental rule of seismic prevention. Regarding seismic risk mitigation, the main purpose is saving as many lifes as possible and reducing the material damage.
The authors propose using a seismic simulator as an instrument of seismic prevention, aiming to simulate earthquakes, at a smaller scale, with controlled parameters, to observe and understand the impact it has over construction sites in a refference zone.
The seismic simulator may be used for educative purpose in schools, universities and research institutes for a better understanding of earthquakes, of the impact it has over construction sites, but also to point out the necessity of seismic reinforcement and implementing seismic safety measures.
Using the seismic simulator in schools and institutions is about reducing the seismic vulnerability of buildings and educating new generations regarding the importance of seismic prevention for a safer future.

*Keywords*: seismic simulator, seismic prevention, seismic risk

# EVALUATION OF PROPOLIS AS ENVIRONMENTALLY-FRIENDLY CORROSION INHIBITOR FOR BRONZE IN SIMULATED ACIDIC RAIN

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## ABSTRACT

In the present work, the inhibitive action of the natural propolis on bronze corrosion in a simulated acidic rain containing Na2SO4 and NaHCO3 at pH 5 was evaluated using electrochemical techniques, namely potentiodynamic polarization and electrochemical impedance
spectroscopy (EIS). Surface characterization was performed by SEM-EDX. Experiments were performed as a function of the propolis concentration and immersion time in the corrosive electrolyte.
Potentiodynamic polarization measurements reveals that propolis might be classified as a mixed-type inhibitor. EIS measurements proved that a highly protective effect was obtained in the presence of propolis after several hours of immersion and it remains stable during time. In the investigated experimental condition, the maximum inhibiting efficiency in the range of 98.9% was obtained by addition of 100 ppm propolis, after about 12 hours of exposure to inhibitor-containing electrolyte through the stabilization of Cu2O on the bronze surface. Further increases in the propolis concentration showed a slight decrease in its inhibiting performances, in agreement with the results obtained by polarisation measurements.
The inhibitive properties of propolis on bronze corrosion are likely due to the adsorption of its main constituents (flavonoids and phenolic compounds), through the oxygen atoms in their functional groups and aromatic rings. The adsorption of propolis on bronze was found to follow Langmuir adsorption isotherm. The surface analysis performed by SEM-EDX confirms that propolis is able to retard the bronze corrosion by formation of a protective layer on the metallic surface.

*Keywords*: green corrosion inhibitor, acidic rain, potentiodynamic polarization, EIS, SEM-EDX

# THE EFFECTS ASSESSMENT OF THE HISTORICAL LAND USE CHANGES IN THE FIRIZA LAKE AREA OF ROMANIA USING RADIONUCLIDE SIGNATURES ($^{210}Pb_{EX}$, $^{226}Ra$)

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## ABSTRACT

The attention on sedimentary archives studies has nowadays increased due to rising awareness of anthropogenic impact on the environment. Changes in the land management have resulted in amplified soil erosion and sedimentation rates in the naturally vulnerable areas. Significant land use changes in the forested areas occurred during the 19th and 20th centuries, with the most important transformations after the 1990s, following the land return to private owners. This study aims to highlight the main causes connecting land use changes to Firiza Lake sedimentation. Using the 210Pb radiometric dating method, it was carried out an assessment of soil erosion effects triggered by the major historical events of land use. The sampled sediment cores were subjected to several laboratory analyses to evaluate the influence of deforestation on the sedimentation rate of the artificial lake. Isotope inventories (e.g. 210Pbex, 226Ra) were measured through gamma and alpha spectrometry and the Constant Rate Supply (CRS) model was applied to calculate the age and the sedimentation rates of the sediment. Organic matter (OM) and Inorganic Carbon (IC) content profiles, obtained using Loss-on-Ignition (LOI) technique, emphasized the effects of forestry activities in the lake watershed. Grain-size measurements were performed in order to evaluate the sediment transport on slope and to differentiate the allochthonous from the autochthonous fine-grain sediment. Combined with the National Forests Management Agency (ROMSILVA) records of land use management, GIS technology provided a spatial analysis of basin morphometry, geology, soil type and land use intensity for a better understanding of the key factors enhancing the soil vulnerability to erosion processes. The sediment yield trend suggested that in the recent years due to inappropriate practices, such as deforestation and road construction, increased from 0.034 ± 0.004 g/cm2*y up to 0.367 ± 0.035 g/cm2*y, consequent to enactment of the land restitution laws (e.g. Law 18/1991; Law 1/2000; Law 247/2005).

*Keywords*: $^{210}$Pb dating, erosion, sedimentation rate, land use.

# MAGNETITE UTILISATION FOR PURGING THE INDUSTRIAL WATERS POLLUTED BY HEAVY METALS

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## ABSTRACT

Seeing that water is a foremost environmental factor, its pollution is a topical problem, with serious consequences upon the health of the population and of the entire ecosystem, in general. Unlike part of the organic contaminants, the heavy metals are not biodegradable, therefore they tend to get accumulated in the living organisms. The heavy metals are extremely toxic, causing the inhibition of the cellular enzymatic processes or some other physiological disturbances. Certain industrial processes, such as the electrochemical coverage one, bring forth high concentrations of heavy metals in the discharged wastewaters.

The paper sets out an innovating technology of purging the wastewaters derived from the galvanic covering processes. The high concentration of heavy metals in the wastewaters has caused the water purging process to be carried out in two stages. The former treatment stage includes such processes as pH adjustment, water oxygenation, electrochemical treatment, coagulation-flocculation and decantation. Since the concentration of the heavy metals in the water resulted from the first purging stage is higher than the maximum concentration allowed by the effective rules pertaining to the used industrial water discharge (as it cannot even be reused within the process), resorting to an advanced purging stage is called for. This one involves the utilisation of magnetite nanoparticles for adsorbing the metals at their surface and retrieving the magnetite-metal concentrated sludge, which is recirculated. The process is unfolded in multiple cycles and in the final stage the metals are removed from the magnetite by washing. The separation of the magnetite-metals solid phase from the water takes place in a magnetic module, where a solenoid fed by an electricity source generates a magnetic field. The magnetite-metals sludge gets agglomerated in the areas where the gradient of the magnetic field caused by the solenoid exceeds a threshold value, which can be reached by feeding the solenoid with continuous pressure of a certain value or with alternative voltage on a 0…500 Hz frequency range. The numerical shaping laid down in the paper for the magnetic module fed with direct and alternating current by using the COMSOL Multiphysics environment, shows the areas of agglomeration, being a useful instrument for designing the module at the industrial scale.

*Keywords*: wastewater treatment, electrochemical treatment, magnetite, metals, pre-oxidation

# THE ROMANIAN CONSUMER AMONG EDUCATION, INFORMATION, HEALTH RISK, FOOD QUALITY AND ETHICS

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## ABSTRACT

The food quality and safety must be a constant concern both for consumers and for authorities. The education for quality and active involvement, coherent and sustained by the state, through the implementation of a quality strategy at national level should be the main "forces" that can contribute the implementation and certification of quality management systems in the agri-food sector.
The meat and milk products represent an important component of human diet; as such their contamination with heavy metals plays a significant role in public health. The concentrations of several human essential trace elements (Mn, Cu, Zn and Ba) and toxic elements (As, Cd, Pb) were analysed in 95 animal-based foods including meat, milk products and honey, collected from Romania market. The inductively coupled plasma mass spectrometry technique (ICP-MS) was used for the determinations.
In order to evaluate the potential health risk of consumers due to metals intake via food ingestion, three indices were calculated: average daily potential dose (ADDpot, mg/kg/day), the hazard quotient (HQ), and hazard index (HI). In terms of food safety, the toxic element concentrations in the majority of the investigated samples were below the maximum permitted levels set by Romanian and European legislation.

*Keywords*: food ethics, animal products food, trace elements, health risk, ICP-MS

# THE QUALITATIVE ASPECTS OF THE TUR RIVER WATER

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## ABSTRACT

The River Tur is a cross border river, which is why the the quality and characteristics of the water are of international importance. The River Tur springs from the Oaș-Gutâi volcanic chain and crosses over the Someș-Tur Plain, where it continues its course into Hungary. The water quality is influenced by natural factors, as well as the human activity plays a big impact in its characteristics. Water samples were collected from seven representative sections, three out of them were monitored by the Romanian Waters Authority. During the analysis, the sample was performed with a multi-parameter and a spectrometer. The obtained results serve a general characterization of the Tur river as well as the highlighting of the main ions. The characteristics of the river water reflect the influence of the Călinești reservoir, the mines in the Gherța area, the agricultural areas, the households, the downstream accumulation bed, the protected wetlands, etc.

*Keywords*: water quality, water characteristics, control section, admissible concentration

# MAX-DOAS OBSERVATION OF TRACE GASES USING THE SWING PLATFORM

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## ABSTRACT

One of the current problems related to atmospheric pollution is greenhouse gas emissions. In this paper we aimed to determine the concentrations on slant columns of NO2 (nitrogen dioxide) and H2CO (formaldehyde) using a new instrument, SWING (Small **W**hiskbroom **I**mager for Trace Gas Monitori**NG**). This equipment is based on the MAX-DOAS technique (**M**ulti-**AX**is **D**ifferential **O**ptical **A**bsorption **S**pectroscopy), which involves the analysis of traces gases in the troposphere by recording the sunlight scattered at different elevation angles. It is a widely used observation method for detecting traces gases with narrowband absorption structure for the UV and visible range of electromagnetic spectrum. The SWING can be mounted on fixed or mobile ground-based platforms as well as on airborne platforms. There will be presented results obtained within the RAMOS (Technical Assistance for a Romanian Atmospheric Observation System) project by performing measurements with the SWING in the Magurele area in Romania during the period 11-14 July 2017. The results obtained from the spectral analysis illustrate the concentration variation on slant columns during a day, observing maximum and minimum values depending on the position of the Sun.

*Keywords:* SWING, MAX-DOAS, pollution, concentrations

# HOW TO MAKE A GNSS LEMONADE OUT OF IONOSPHERIC LEMONS: USE OF ERRORS IN IONOSPHERIC MONITORING

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## ABSTRACT

GNSS signals traveling through the ionosphere are affected by the ionospheric plasma via different processes. The signal speed and direction is modified, causing delays and distortions of the signal at the receiver, which in turn result in problems and errors of positioning. These errors, obviously unwelcome for an accurate navigation, can be used to monitor the state and dynamics of the ionosphere. Ionospheric studies are not a focus point of research in Romania, or at midlatitudes in general, because the dynamics here are less spectacular when compared to high and low latitudes. However, the midlatitude ionospheric state can be used as a diagnosis for various processes in space, atmosphere and terrestrial crust. Effects of space weather or geomagnetic storms on the ionosphere are relatively widely documented for high and low latitudes; however their effects at mid latitudes are less known. Medium scale travelling ionospheric disturbances (i.e. ionospheric density fluctuations on horizontal spatial scales between then to hundreds of km) are associated with atmospheric gravity waves, mainly caused by tropospheric winds and various high-latitude sources. The possibility that earthquakes have ionospheric precursors, whose immediate use needs no argumentation, is a highly controversial topic due to the very low signal-to-noise ratio. We review here the possible use of GNSS for environmental monitoring capabilities based on total electron content (TEC) variation.

# A REVIEW OF OBSERVATIONS OF CLOUD COVER

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## ABSTRACT

Clouds have a large contribution to the terrestrial radiation budget (and, following, on climate variability) but they are the least known climate element and their modeling is accompanied by high uncertainties. This is due to important gaps in knowledge of both microphysics and formation, and to lack of long-term continuous observations at global scale. Clouds are observed from below, using what we call ground based observations, and from above, using equipments on satellites (satellite data). Ground based data may extend over large periods but they lack a good coverage and, sometimes, suffer from significant discontinuities. Satellite data are global, continuous but they cover a relatively short climatological period (three-four decades at most) and may be subject of artefacts affecting, sometimes, trends and separation between various types. We review here the advantages of both ground and satellite based observations and identify questions that need to be addressed for a better understanding of cloud response and feedbacks and for reducing uncertainties in cloud modelling.

# SOFTWARE DEVELOPMENTS FOR MONITORING METEOROLOGICAL AND RADIOLOGICAL PARAMETERS

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## ABSTRACT

A critical requirement for an effective forecast and/or an Early Warning System is adequate observational data at both the ground level and near ground surface (heights from 10 m to 100 m).
This includes the parameters for: temperature, air humidity and pressure, solar net radiation and complex wind data (speed, direction, standard deviation of wind direction, etc.). In addition to this, for radiological measurements, it is necessary to measure, at least, the ambient gamma dose rate. Parameters to be measured for each type of hazard should be monitored constantly and processed on a real-time or near real-time basis. Based on these requirements, we have developed a suite of software packages for data acquisition and storage, analysis and visualizing.

*Keywords*: real time monitoring, meteorological data, radiological data, Early Warning System

# RETRIEVAL OF AEROSOL OPTICAL DEPTH FROM SEVIRI/MSG DATA FOR POLAND, CZECH REPUBLIC, ROMANIA, AND SOUTHERN NORWAY

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## ABSTRACT

An algorithm that allows to retrieve SEVIRI Aerosol Optical Depth (SEVIRI-AOD) at a spatial resolution of about 5.5 x 5.5 km with a frequency of 15 minutes for four areas: Poland, Czech Republic, Romania, and Southern Norway is presented. The threshold approach for handling the uncertainty of the SEVIRI-AOD estimation is proposed. Results of calculations performed for qualified days of September 2014 - SAMIRA test month - are discussed along with the advantages and limitations of proposed methodology.

# STUDY ON THE IMPLEMENTATION OF WASTEWATER COLLECTION AND TREATMENT SYSTEMS IN VILLAGES WITH LESS THAN 2000 INHABITANTS

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## ABSTRACT

Water pollution is one of the biggest issues worldwide. Taking into account the European Economic Community and international treaties with regard to preventing the environment from being adversely affected by the disposal of insufficiently treated urban waste water, there is a general need for secondary treatment of urban waste water. It is necessary to perform additional treatment in sensitive areas; whereas in some less sensitive areas a primary treatment could be considered appropriate. According to Council Directive 91/271/EEC of 21 May 1991 concerning urban waste water treatment, Article 7, Member States had to make sure that, by 31 December 2005, urban waste water entering collecting systems, to be subjected to appropriate treatment before being discharged into fresh water and estuaries, from villages of less than 2000 inhabitants. Choosing the best technology for the local conditions it is a complex task. The problems associated with this are the development of various appropriate technologies and planning methods. This study refers to the development of a sewage treatment system at root level. In a root-level sewage treatment plant the cleaning of the waste water takes place, using numerous complex processes. The study presents a method system that has been used in Western Europe and in the USA for almost twenty years – various wetland model variants and development of this method. It is important to build a design of domestic wetland within the Romanian climatic conditions and the model parameters adapted to sewage water quality improvement, for a better functioning of rural areas in Romania.

*Keywords*: water treatment, natural wastewater treatment systems, constructed wetland