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Water Across Time in Engineering Research

BOOK OF ABSTRACTS

International Conferences

HYDROFRACTALS'18
WATER 2018
WSD 2018

ROMÂNIA
1918-2018 | CELEBRATING TOGETHER

Editors:

Carmen Maftei **Constantin Buta**

Konstantinos Papatheodorou **Alin Andrei Cârsteanu**

Ichinur Omer

EX PONTO
Constanta, 2018

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Unknowable and knowable moments: are they relevant to hydrofractals?

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Abstract

- ***Introduction***

Classical statistical moments, sometimes of high order, have been a customary diagnostic tool in fractal analyses of hydroclimatic processes. However, it has been articulated that they cannot be estimated from typical samples for order beyond two. In other words, high-order moments, albeit useful in characterizing certain properties of processes, are mostly unknowable.

- ***Methods***

A class of knowable moments (K-moments) is introduced, which virtually contains the classical moments as well as the L-moments.

- ***Results and significance***

The latter are better estimated form samples, but they all are expectations of linear expressions of the process of interest and thus they cannot characterize even second-order dependence of processes. The K-moments overcome this deficiency of L-moments and are readily expanded to multi-scale analyses of processes.

- ***Conclusion***

Thus, they provide stochastic tools, such as the K-climacogram and K-climacospectrum, which can potentially be relevant to hydrofractal analyses.

Keywords: *stochastics, statistics, moments, rainfall, turbulence*

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Hydraulic head estimation at unobserved locations: Estimating confidence intervals for the absolute error based on stationary stochastic models and geologic interpretations

Andreas Langousis [1], Vagia Xevgeni [1], Vassilios Kaleris [1]

[1] University of Patras, Department of Civil Engineering, Greece

Abstract

- ***Introduction***

Over the past years, several hydrogeological studies have focused on the influence of heterogeneity on groundwater flow and contaminant transport in porous media. Nevertheless, its effect on hydraulic head estimation at unobserved locations in an aquifer has received less attention. Hence, parameterizing the uncertainty that the spatial variability of hydraulic conductivity induces in hydraulic head estimates, constitutes an important topic for engineering applications.

- ***Methods***

In this work, we use four stationary stochastic models to simulate scaling and non-scaling representations of hydraulic conductivity fields. We do so for one-dimensional confined media and study how their statistical structure affects the distribution of the absolute error |e| in hydraulic head estimation. The latter is calculated as a function of the characteristic scale lc of geologic formations, the standardized distance from the nearest measuring location, and the small scale variability inside each formation.

- ***Results and significance***

We show that the resulting distribution of |e| has attributes (bounds, multi-modal features etc.) that can be explained using simple geometric arguments, and statistical characteristics (mean value, variance, quantiles etc.) that depend on the statistical structure of the hydraulic conductivity field at multiple spatial scales $l \neq lc$.

- ***Conclusion***

Finally, we present confidence intervals for the absolute error in hydraulic head estimates in-between measuring locations, which encompass all possible small-scale dependencies of hydraulic conductivity in a stationary setting.

Keywords*: stochastic modeling, multifractals, statistical scaling, hydrogeology*

Corresponding author: Andreas Langousis, e-mail: andlag@upatras.gr

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Temporal downscaling of altimetry-based Ganges-Brahmaputra River discharge

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[5] Bangladesh University of Engineering and Technology, Institute of Water and Flood Management, Dhaka, Bangladesh

Abstract

- ***Introduction***

In this study, using 50 years (1950-2000) of in situ measurements of daily discharge of Ganges and Brahmaputra rivers, we first establish that there is no obvious evidence of the impact of climate change on the discharge of either river.

- ***Methods***

Having established weak second order stationarity, we show that there exists a power-law (simple) scaling between 2 days and 32 days for both rivers' normalised discharge fluctuations. Using these simple scaling relations, we develop a downscaling model to temporally disaggregate discharge from a 32-day timescale to a daily timescale.

- ***Results and significance***

This is first illustrated using a proof-of-concept approach by aggregating the given daily discharge to that at 32 days, and then stochastically disaggregating it using a combination of inverse Haar wavelet transform and the scaling relations mentioned above. The stochastic nature of the proposed model enables one to create an ensemble of downscaled daily discharge.

- ***Conclusion***

Following this, we test the validity of the proposed downscaling model by disaggregating altimeter-derived 10-day discharge over both Ganges and Brahmaputra rivers for the years 2009-2012 to daily time scale, and comparing the resulting ensemble with in situ daily discharge.

Keywords*: simple scaling, disaggregation, discharge, altimetry*

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Low-order moment characterization of stable motions: The AR (1) case

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Abstract

- ***Introduction***

Stable motions are stochastic processes, with marginal probability densities that belong to the class of stable distributions.

- ***Methods***

Depending on the nature of the increments, as well as their dependence or independence relative to preceding time steps, these processes may be stationary or non-stationary.

- ***Results and significance***

The present work focuses on the joint distributions that characterize the random variables corresponding to successive time steps of the process, under conditions of stationarity, for strictly stable, symmetric marginals, and different values of the stability parameter α.

- ***Conclusion***

The implications of the study findings for stochastic simulation and forecasting are demonstrated and discussed based on example cases.

Keywords*: fractional moment, stable process, auto-regressive*

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Preliminary analyses on scale-invariance signature on IMERG v04 Global Precipitation Measurements

Stefano Farris [1], Maria Grazia Badas [1], Francesco Viola [1], Roberto Deidda [1]

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Abstract

- ***Introduction***

Multifractal models proved to be very efficient tools in reproducing observed space-time rainfall variability.

While they certainly offer good potential for practical applications, such as coupling meteorological and hydrological models for flood forecasting, their effective calibration requires the investigation of scale invariance laws on high resolution space-time precipitation fields.

- ***Methods***

In the last decades, successful calibrations have been pursued using remote sensed measurements in some target areas. Nowadays, new opportunities arise from the Global Precipitation Measurement (GPM) mission, launched in 2014, which provides a worldwide precipitation monitoring at unprecedented spatiotemporal resolution.

- ***Results and significance***

The objective of this work is to investigate the scale-invariance signature on GPM IMERG v04 precipitation products at 0.1 degree and 30 minute resolution in space and time, respectively.

- ***Conclusion***

Results are then evaluated against a high density rain gauge network in Sardinia (Italy).

Keywords*: Global Precipitation Measurement, scale-invariance signature*

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Multifractal assessment of precipitation data merging: improvement or misleadingness?

Ioulia Tchiguirinskaia [1], Abdellah Ichiba [1], Igor Paz [1], Auguste Gires [1], Elektra Skouri-Plakali [1], Daniel Schertzer [1]

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Abstract

- ***Introduction***

The ENPC polarimetric X-band radar was used to test and compare different algorithms using single and/or double polarisation and their comparison in the context of different studies and with respect to other precipitation data.

- ***Methods***

The ENPC polarimetric X-band radar, which we acquired in framework of the EU RainGain project and Paris Region RadX@IdF project, was used to test and compare different algorithms using single and/or double polarisation and their comparison in the context of different studies and with respect to other precipitation data (Météo-France C-band radar, rain gauge and disdrometer networks).

- ***Results and significance***

These studies have shown that merging radar data with in-situ networks does not necessarily improve the precipitation measurement. Indeed, the network spareness can introduce important biases with respect to the extreme variability of precipitation over a wide range of space-time scales, which is best, captured and represented with the help of Universal Multifractal (UM).

- ***Conclusion***

In this framework, we define a fusion compatibility criterion based on the intersection theorem between two multifractal fields. We show that conditioning radar data by an in-situ network could be rather counterproductive for rainfall events with $C1/(\alpha - 1)$ being weaker than the fractal co-dimension of this network: the in-situ network then introduces a bias in the rainfall estimates instead of refining them.

Keywords*: multifractal, radar, polarimetric, data merging, modeling*

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Clouds and precipitation, multivariate multifractal fields and examples of stochastic Lie algebra of their generators

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Abstract

- ***Introduction***

Multifractals or multiplicative chaos have become iconic models of clouds and precipitation over a wide range of scales with the help of an infinite hierarchy of scale-invariant singularities. They were introduced on the physical idea of interacting cascades of respectively the wind fields and the water content across scales. For various reasons, including the classical use of rain rate in hydro-meteorology, computer limitations and the lack of vector multifractal simulations, they were reduced to a unique, multiplicative cascade of the rain rate. This oversimplification was initially quite helpful to quickly grasp qualitatively new insights, including for applications (e.g., extremes and radar meteorology), and thus became widespread. Nevertheless, it also introduced theoretical limitations and discrepancies with empirical data that it is timely to resolve.

- ***Methods***

Multifractal vectors or multivariate multifractals began to be investigated in the 1990s, but have remained rather abstract and speculative. On the contrary, we first introduce in this presentation the concrete example of multifractal vector fields generated by stable Levy generators on a Clifford algebra, then point out some generalisation.

- ***Results and significance***

We introduce Clifford algebra, which broadly generalise complex numbers and quaternions, with the help of symmetries as simple as orthogonal rotations and mirror symmetries that respectively square to minus and plus identity. This enables us to underline the role of spherical and hyperbolic geometries that are respectively associated to square roots of minus and plus unity. Hyperbolic subspaces require extremely asymmetric Levy noises to obtain finite statistics, whereas there is no constraint on spherical subspaces. We also show that they generate across scales flows of their respective types.

- ***Conclusion***

In conclusion, we show how this example can be generalised with the help of more general stochastic Lie algebra that could be relevant for other problems of theoretical hydrology.

Keywords: *multifractal, vector field, precipitation, clouds, cascades*

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Simple framework for modelling geophysical processes with emphasis on intermittency

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Abstract

- ***Introduction***

The small scale of some geophysical processes, such as turbulence, wind, precipitation, river discharge, solar radiation etc., is usually characterized by intermittency. Although the accuracy of observations in the area of low values is considered problematic, it is a challenging task to emulate this behaviour and simulate in a robust stochastic manner these values (e.g. zero values in non-negative processes).

- ***Methods***

This behaviour is usually modeled through a two-state process distinguishing the low-value and large-value state by simulating each of the two in different ways. Here, we propose an alternative scheme that is based on a single continuous-type distribution and a single second-order dependence structure in continuous time.

- ***Results and significance***

This requires the simulation of arbitrary marginal distributions, with for example very high skewness and kurtosis, as well as the ability to preserve any second-order dependence structure.

- ***Conclusion***

These requirements can be satisfied in a rather simple manner using a recent explicit-implicit simulation framework [Dimitriadis and Koutsoyiannis, SERRA 2018; Koutsoyiannis, submitted 2018], which is here tested with fine time scale precipitation, wind and grid-turbulence, and with particular emphasis given on the preservation of the intermittent behaviour.

Keywords: *intermittency, single continuous-state framework, explicit-implicit scheme*

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Lack of 4D connectivity of the Danube and its implications on fractal dimension

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Abstract

- ***Introduction***

Motivated by the dramatic climatic change in recent decades and especially by the increased frequency of extreme events – 2006, 2010, the study focused on developing models and scenarios of climate change related to land use change and flooding.

Thus, under the given circumstances, the best option is to foresee a policy on the Lower Danube riverbed, followed by a series of advanced tools for exploring 4D Reconnection (longitudinal, lateral, vertical and temporal) of the floodplain. This will provide a spatial planning tool, developed in accordance with these features, and will design, analyze and evaluate long-term policies in an ecological, social, economic and cultural context.

- ***Methods***

Fractal analysis is a valuable tool that can examine and describe river morphology, its changes, hydrological functions and needs for ecological restoration. The application of fractal geometry provides a methodological contribution and quantitative analysis to describe the relationship between geomorphological processes and the degree of convolution of the arm, towards describing evolution scenarios.

- ***Results and significance***

After processing the data available: Sf. Gheorghe 1870 map and 2011 orthophotomap using the Benoit application, it appears that, following the work of embankment, fractal dimension increased from 1.21 to 1.29 (the value has increased due to the new hydro geomorfological structures that appeared – islands and canals). Our work followed the evolution scenario, reviewing the data collected on the dynamics of this area. The proposed scenario shows the extinction of the channel meanders and the distribution of the flow towards the areas with hydrotechnical works and the development of emergent islands on the arm (in case of no other interventions). In this case, the fractal dimension has a value of 1.23, indicating a tendency to return to the natural state (D = 1.2).

- ***Conclusion***

Our results suggest a growth of the fractal dimension, in correspondence with a gradual transition from a meandering network to a straight-channeled network, but with other new morphological forms due to hydraulic engineering interventions, which correspond to the progressively greater influence of processes like erosion and morpho-selection, which will lead over time (without interventions) to the natural meandering shape of the arm. Thus, the meandering network developed by overlapping patterns of current deposit on an inherited landscape is molded due to hydraulic interventions in a hydrological regime different from their previous one, but with a tendency to return to their natural state.

Keywords*: 4D connectivity, fractal analysis, hydro-morphological changes*

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Section A:

SDEP: Sustainable Development and Environmental Protection
WQEH: Water Quality and Ecosystem Health
IWM: Integrated Water Management

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Collaboration between municipalities and industry in circular waste water management

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Abstract

- ***Introduction***

This paper brings a case study solving the treatment of municipal waste water originating from small villages and towns, which are located close to each other in a highland protected landscape area in the Czech Republic. A high environmental efficiency of the waste water treatment is required to establish strong sustainability in the region.

- ***Methods***

Two scenarios of the technical solution were developed. In the first scenario, separate waste water treatment plants will be built and operated in each of the villages and towns. In the second scenario, (only) sewerage networks will be built in each village and town and the waste water will be collected, transferred and treated in a waste water treatment plant of a chemical factory, which is located down the stream. The second scenario seems to be quite realistic, because the factory has to reconstruct and modernize its waste water treatment plant in near future anyway.

- ***Results and significance***

The analyses have shown that the second scenario is environmentally quite beneficial. It ensures high water quality in the watercourses in the landscape protected area, because the treated waste waters are not discharged to the water streams in the protected area. The purified water is used for industrial purposes (instead of the fresh water from the stream); and, moreover, the company would be able to replenish the water balance and/or flows in dry periods from the treated water stored in the company's water lagoon.

The second scenario also appears to be beneficial from a socio-economic point of view. Cost savings (- an "extra cake" in game theory terminology), appearing mostly at the side of the industrial company, creates space for negotiation and an agreement between the municipalities and the company. The company's image will also improve in the case of implementing the second scenario. But there is a strong information asymmetry between the subjects, i.e. both company and municipalities keep confidential how much they are willing to contribute to the projects.

- ***Conclusion***

Our research team has prepared and conducted an economic laboratory experiment investigating: (i) whether the negotiations between the municipalities and the company end in the support of the second variant without an external financial subsidy support; (ii) how the "extra cake" is distributed among the subjects. The results of the experiment will be presented at the conference.

Keywords: *water quality management, circular economy, economic laboratory experiment*

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Water usage in food industry and wastewater treatment for environmental protection and proper destination

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Abstract

- ***Introduction***

Wastewater is the combination of liquid and water-transported wastes from industrial facilities, along with any groundwater infiltration and surface water and storm water inflow that may enter the sewer system or discharged directly to the streams and rivers, contaminating them and so cause environmental problems that further need is to be solved. It very imperative duty the fact that treatment is required for suspended solids and for dissolved organics. Special processes may be necessary to achieve removal of specific pollutants like organic compounds which may have greater impact to the water quality and so scientific research need to be undertaken to find the proper way of their treatment. In this context our work deals with getting better results for avoiding the environmental troubles, and possibly for finding the engineering solutions in order to energy profit from them or gaining some specific chemicals.

- ***Methods***

Computerized models and simulation have been used to aid the engineers in a number of aspects of wastewater treatment methodology, facility design, process synthesis and alternatives evaluation, as well as plant operational parameters.

- ***Results and significance***

In the food industries during material processing it is required large quantities of potable water, and nearly all of this is discharged as risky contaminated with strength organic compounds, nutrient (nitrogen and phosphorus), fat and other microbial contaminated effluent.

- ***Conclusion***

From our results shown in the paper it is evident the preparation of a national guidance manual with a menu of water management measures and practices from which to choose for various sources and categories of organic wastes, and that is why we have tried to apply also possible models and following with simulation procedure towards the use of waste characteristics to establish and design a proper process diagram for their treatment and energy profit through their proper handling.

Keywords*: industrial waters, wastewater; food processing, modeling and simulation, water performance*

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The use of wastewater treatment installations type biological filters for removal of pollutants from wastewater

Mădalina Boboc [1], Constantin Marius Raischi [1], Andreea Ioana Dăescu [1], Iustina Boajă (Popescu), Mariana Mincu [1], Elena Holban [1], Simona Diana Fronescu [1], Vasilica Dăescu [1]

[1] National Institute for Research and Development in Environmental Protection, Bucharest, Romania

Abstract

- ***Introduction***

Biological filters are treatment installations that contain a granular filling material, which form a biological film that contribute to the bio-oxidation of impurities from the wastewater. Recent researches carried out in this field have pursued improvement of classical types of treatment installations with aerobic fixed film by making a new usable material as a load filtered.

- ***Methods***

The experimental determinations from this paper were made on biological filters loaded with volcanic tuff.

- ***Results and significance***

The biological filtration efficiency was monitored and established throughout the operation of the experimental installation through physico-chemical and biological analysis.

- ***Conclusion***

The monitored indicators were the ones stipulated by the legislation in force and the treatment efficiencies were calculated in various hypotheses which will be presented in this paper.

Keywords*: wastewater, biological filters, treatment efficiency*

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Research on the implementation of extensive natural processes, without energy consumption, for sustainable wastewater management

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[2] University of Agricultural Sciences and Veterinary Medicine from Cluj Napoca, Faculty of Horticulture, Romania

Abstract

- ***Introduction***

Wastewater management is a topical issue in the context of sustainable development at the World Summit on Sustainable Development in Johannesburg in 2002, due to the 3 billion people worldwide who do not have access to a collection system, transport system and waste water management. Sustainable development is now a necessity in the context of climate change, over-consumption of energy, discharges of very large amounts of waste into the environment, poverty and social exclusion, poor management of natural resources, biodiversity loss, inappropriate soils exploitation are situations that are encountered everywhere, affecting the long-term quality of life of the planet's population. In this context, the implementation of energy-free municipal wastewater collection and management systems is undoubtedly a truly sustainable solution, respecting the basic principles of environmental protection, public health protection, identification of economic resources for construction and exploitation, in harmony with socio-cultural integration within the human settlements they serve.

- ***Methods***

The practical validation of these solutions is being tested on the Cojocna agro-zootechnical farm, belonging to the University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Romania, and covers wastewaters from the domestic use of administrative buildings, rainwater and meteoric waters, but also agro-zootechnical wastewater from farm animals. The research methodology is based on in situ calculations and determinations on the farm, carried out by a complex and transdisciplinary research team, and presented in the paper.

- ***Results and significance***

This paper presents solutions for the sustainable management of wastewater without energy consumption, using extensive treatment processes, based on natural processes of decomposition and assimilation. The system consists of the multipurpose filtration anaerobic biological reactor, representing the primary stage, the horizontal or vertical lower flow filter plate, representing the secondary stage and the upper flow filter plate, representing the tertiary stage.

- ***Conclusion***

The overall conclusion that emerges from the research is that the energy-free management plant using natural processes is a possible and robust, high-efficiency, flexible, adaptable solution with easy deployment in all conditions, as of the application implemented for Cojocna agro-zootechnical farm, Cluj, Romania.

Keywords: *wastewater management, extensive natural processes, zero energy, sustainable development*

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Implementation of ultrasound to stabilize the nanodispersed structure of alumosilic reagents for wastewater treatment

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Abstract

- ***Introduction***

The complex reagent AKFK (aluminum-silicon flocculant-coagulant), a new alumosilicic flocculant-coagulant, has both coagulating and flocculating properties; it ensures higher level of water purification from petroleum products in comparison with reagents that are conventionally used. The wide use of AKFK is constrained by the ability of the reagent to form a gel, which leads to a loss of its commercial characteristics. The main goal of the present work is to increase of the efficiency of the AKFK flocculant-coagulant.

- ***Methods***

Short-term ultrasonic treatment is used for the preservation of an active silicic acid sol and prolongation of the shelf life of the AKFK.

- ***Results and significance***

To study the effect of ultrasound on the efficiency of AKFK, a large number of experiments on the purification of model emulsions were performed both at room temperature and at reduced temperatures. The obtained results of experiments indicate a noticeable increase in the efficiency of the AKFK flocculant-coagulant after a 1 min ultrasonic pretreatment. The concentration of AKFK in terms of Al2O3 was 20 mg/L when conducting experiments on the purification of model mixtures at a temperature of 25°C and 40 mg/L at temperature of 6°C. Ultrasonic treatment of the reagent was performed before its mixing with the polluted water, 72 h after reagent preparation (at the moment when the reagent reached the maximum efficiency).

- ***Conclusion***

Short-term ultrasonic treatment facilitates the preservation of an active silicic acid (ASA) sol and prolongs its shelf life more than twofold, which can be associated both with an increase in the concentration of coagulation centers and with a change in the radius of the sphere of particle attraction.

Results of experiments indicate a noticeable increase in the efficiency of the AKFK flocculant-coagulant after relatively short ultrasonic treatment. With the correct selection of the ultrasonic pretreatment technology the residual concentration of petroleum products can be reduced more than twofold using AKFK reagent.

The work was partially supported by project N2219T " Tehnologie de nanoremidiere a solului contaminat cu pesticide reziduale".

Keywords*: wastewater treatment, ultrasound, flocculation, coagulation*

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Hydropower socio-economic contributions for sustainable development – a worldwide perspective

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Abstract

- ***Introduction***

Hydropower is a renewable energy that is expected to be affected by persistent climate change in many regions of the world. In the same time, hydropower was the first renewable energy source used by people, more than 2000 years ago. In the present, there are countries, like Norway, where 99% of electricity comes from hydropower. The world's largest hydropower plant is the 22.5 GW Three Gorges Dam in China. It produces 80-100 TWh/year, enough to supply over 70 million households.

This study aims to give an overview of the present situation of hydropower and its future social, economic and innovation perspectives and challenges.

- ***Methods***

Using quantitative analysis, the paper provides useful insights concerning first of all the status of the current overview of hydropower sector. Also, a detailed qualitative analysis on the impact of economic, social and technological trends of hydropower is conducted in order to contribute to the enrichment of the research field.

- ***Results and significance***

Between 2000 and 2015, hydropower has recorded an increase in electricity generation from 2.625.750 GWh to 3.899.341 GWh. Also, in terms of installed capacity, in 2015, there was registered 1.098.805 MW. The first three countries in terms of capacity added, in 2016, were: China, Brazil and Ecuador. In 2016, China had 28% of hydropower global capacity.

Regarding the innovation development, the number of patents in hydropower grew from 918 patents in 2000 to 36.331 in 2016. China remarks in this segment with 1143 patents in 2013. From the social perspective, hydropower is the third employment sector through renewable energy sources. Out of the 9.8 million employees in the field of renewable energy, more than 1.73 million serve in hydropower in 2016 compared to 1.52 million in 2012. Regarding the employment, hydropower has 18% of total jobs in renewable energy.

- ***Conclusion***

It can be observed that hydropower is a sector on an ascending trend with major social, economic and technological implications. Despite slower capacity growth, hydropower will remain the largest source of renewable electricity generation. Its positive impact for all dimensions is beyond climate risk of the hydropower industry. There are voices which suggest that hydropower may be excluded from some "green" investment mechanisms due to its perceived carbon footprint.

Keywords*: hydropower, sustainable development, hydropower evolution, economic impact, social impact*

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Comparative analysis of selected environmental indicators within adjusted savings in Serbia and Romania

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Abstract

- ***Introduction***:

Environmental indicators allow local and global environmental monitoring. The values of the environmental indicators indicate a certain state and phenomena on the basis of which environmental protection measures can be taken. Additionally, environmental indicators provide an opportunity to compare two or more different environments in a particular unit of time.

- ***Methods***:

This paper presents a comparative analysis of selected environmental indicators within adjusted savings in Serbia and Romania between 2008 and 2014. The indicators on which the comparative analysis is based are the following adjusted savings: particulate emission damage, carbon dioxide damage, and energy depletion. Considering that national environmental indicator methodologies of Serbia and Romania are equivalent to the EEA methodology and within the DPSIR framework, the paper utilizes applicable national methodologies. In addition, the adjusted savings of environmental indicators according to the World Bank are used.

- ***Results and significances***:

The most significant results obtained from the comparative analysis are presented in the paper. The final section deals with the status of the selected indicators over the analyzed period, as well as with the possibility of influencing specific environmental phenomena and processes in order to improve the values of certain indicators in the future.

- ***Conclusion***:

Identification of increased values of environmental indicators within adjusted savings in one area, while reducing the same values in the other area can indicates the state of environmental protection. Based on the comparison of the environmental indicators in the area of adjusted savings in Serbia and Romania, different images are obtained regarding the emission damage, carbon dioxide damage, and energy depletion.

Keywords: *comparative analysis, environmental indicators within adjusted savings, Serbia, Romania*

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A strategy for improvement of water resources

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Abstract

- ***Introduction***

Dolj County is one of the five counties of the macroregion of South-West Oltenia. The water resources of Dolj County are rich and come from various sources (Danube River; River meadow lakes – Bistret; Wetlands of international importance - Blahnita, Calafat-Ciuperceni-Dunare, Bistret, and Confluence Jiu-Dunare).

- ***Methods***

The main purpose of our article is to outline a strategic framework for the improvement of the environment protection. The core element of this approach is the water protection in the context of the widely debated climate change and the fluctuation of water resources from a dual perspective, both quantitatively and qualitatively. Jiu (inland river that assures a water debit of 2109 million m^3 per year) and Danube river (20000 million m^3 of water per year) are two very important water sources of Dolj County, but, at the same time, they are a potential source of floods as well. Starting from the surface water quality of the two rivers (Jiu – with 2141 kilometres total length of monitored water body, and Danube – with 2481 kilometres total length of monitored water body) we arrived at the conclusion that the water strategy required a strong relationship with other pollution prevention and reduction strategies at regional, national and European level. The data used in this research are collected from national and international statistical sources.

- ***Results and significance***

The results of the research provide the assumption that water is a key determinant of a strategic model of environment protection and development of circular economy. The article extends the existing literature with a critical discussion of water as a both source of life and disaster (floods). For this reason, in case of floods, the information about the seriousness of the situation and the characteristics of the environment are essential in every stage of the decision-making process in order to act effectively because it is important not only to control the situation but also to manage the processes and the environmental impacts.

- ***Conclusion***

This is why a number of European Union specialists and research programs have focused on the need to provide information on the nature of the disaster and the characteristics of the environment, as well as on the distribution of this information over the Internet and by means accessible to policy-makers.

Keywords: *water, sustainable development, strategy, disaster, Dolj County*

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Binomial: Water -Tourism

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Abstract

- ***Introduction***

At present time, the climate and uncontrolled climate changes are the most dynamic show compared to the other elements of the environment when the human being, thanks to his ability to reason, ability that drives us apart from the other kingdoms, is aware (truly a little bit late, in the twelfth hour of his existence) that his physiological resources are exhaustible and that everything, just like in life, has a limit of consumption, imposing on him a permanent need of adaptability, prevention, strategy for the improvement not only of the behaviour but also for the preservation of that resource. Unfortunately, the water is one of the exhaustible vital resources!

Such solutions bring more varied and more natural features and processes into cities, landscapes and marine landscapes through locally adapted, resource-efficient and systemic interventions.

- ***Methods***

There are multiple evidences in the literature regarding the successful implementation of nature-based engineering solutions in urban planning and environmental management across Europe. These must be urgently multiplied and mainly applied in the tourism industry which is one of the industries with a major impact on the balanced functionality of the environment, of the water in general, naming the cruise tourism, balneary tourism, spas that cannot exist, nor function outside this vital element: the water.

- ***Results and significance***

The reconstruction-restoration-revitalization solutions-SRRR are efficient, cost-effective, adaptable, multifunctional and durable. They can contribute to the sustainable development of the economy as a whole, providing socio-economic benefits, jobs and technologic innovations of low-carbon emissions. The reconstruction-restoration-revitalization solutions-SRRR are in line with the principles of the Ecological Modernization Theory (EMT).

The tourism and hospitality industry should recognize the transformative potential of the solutions based on the nature's ability to self-restrain in stimulating sustainable management practices.

- ***Conclusion***

In this regard, this article aims to identify how nature-based solutions (SRRR) can address the many challenges affecting the tourism and hospitality industry, in particular the consumption and vital and imperative need for water, without which neither the tourism industry, nor the tourist could function qualitatively, durably.

Keywords*: ecological economy, tourism, sustainable development, water, solution*

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Policies on water protection and management and their consequences on the Romanian economy

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Abstract

- ***Introduction***

The present study, conducted through an interdisciplinary research, which is to be presented at the conference, will discuss some issues of utmost importance raised by the environmental policy requirements of the European Union, focusing primarily on water protection and management, starting from the framework directive no. 2000/60/CE, amended by directive no. 2455/2001/CE.

- ***Methods***

This directive has underpinned a modern and holistic water policy within the European Union. We will also analyze how Romania, as a member state of the European Union, meets the requirements imposed by the management program created for each geographical area. The new water management policies require rethinking the relationship between economic activities and the environment, the adoption of a new mentality regarding the nature, the natural elements of the earth, the development of environmental economics, etc.

- ***Results and significance***

From an economic perspective, the environment can be protected if there are concrete measures to reduce or prevent pollution and if a clear position is adopted, taking into consideration the strategic importance of water resources in the sustainable social and economic development of the country. Romania has signed important agreements, international conventions, has contracted structural funds to ensure water quality and the efficient use of resources, etc. By signing and adopting these contracts, our country is focusing on an environmental management integrated in the European eco-economy model.

- ***Conclusion***

The stage of implementation of the European directives on water protection and management is part of a secondary section in the analysis and will provide details on how Romania managed environmental investments and implicitly their impact on the Romanian economy in the period 2014-2020, but also the new opportunities that the country is facing.

Keywords*: sustainable development, water protection and management, economy-environment relationship*

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How involved are banks in environmental protection and promoting sustainability? Case study: Romania

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Abstract

- ***Introduction***

For a long time, the issues of environmental protection, ecological equilibrium and sustainability have become important topics of debate around the world, impacting not only the quality of life but also the economic development.

- ***Methods***

Our paper focuses on analysing how banks organize the monitoring and observance of the sustainability and environmental protection principles and their embedding in financing decisions. We have also considered investigating the annual reports issued by the main Romanian commercial banks and by the central bank regarding the existence of explicit elements of social and environmental sustainability in the financing activities, and the assessment of the real involvement of these banks in the sustainability and environmental protection issues.

- ***Results and significance***

Raising awareness on environmental issues and sustainability among consumers and business environment has also extended to the area of financial and banking decisions. It is interesting that the banking activity stricto sensu is considered to be ecologically friendly in terms of environmental footprint (e.g. pollutant emissions, consumption etc.). However, the real impact on the environment is overwhelmingly linked to the relationship of banks with their clients' activities, which is difficult to estimate due to their size and diversity. In the vast majority of cases, the banking system has relatively slowly and sometimes defensively reacted to the imperatives of sustainability and environmental protection, often as a response to the changing paradigm of contemporary development. Particularly in the lending process, banks preferred not to hinder the financial analysis of companies with additional environmental requirements, arguing that it is not appropriate to demand additional measures to those required by national legislation specific to their clients' business areas.

- ***Conclusion***

Gradually, motivated by the need to regain the confidence of the business environment and communities, to align their strategies with public policies and under the shareholders' pressure, banks have begun to consider sustainability requirements by acting to reconcile financial goals with environmental, social and sustainability issues. However, we must not ignore that many of the principles and codes of conduct relevant for business decisions have a voluntary base, and banks frequently combined environmental protection decisions with profitable investments in environmental risk area.

Keywords: *responsible business, environmental protection, sustainable banking principles, Romania*

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Integrated water management of energy complex and sustainable balanced scorecard method

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Abstract

- ***Introduction***

This paper presents a consequence analysis for the water quality and Integrated Water Management of Energy Complex for the Balkan.

- ***Methods***

Ranking of pollution effects based on the Strategy Principles of Sustainable Balanced Scorecard Method (BSC).

Table T.1 List of water quality disturbance aspects

	Water aspects
1.	Location energy complex in relation to the catchment area
2.	Release of process water
3.	Increased concentration of heavy metals
4.	Flowing of water into the recipient

- ***Results and significance***

Use of the BSC methodology involves the ranking water aspects.

Table 2 Aspect importance assessments, results of pairwise comparison of selected criteria

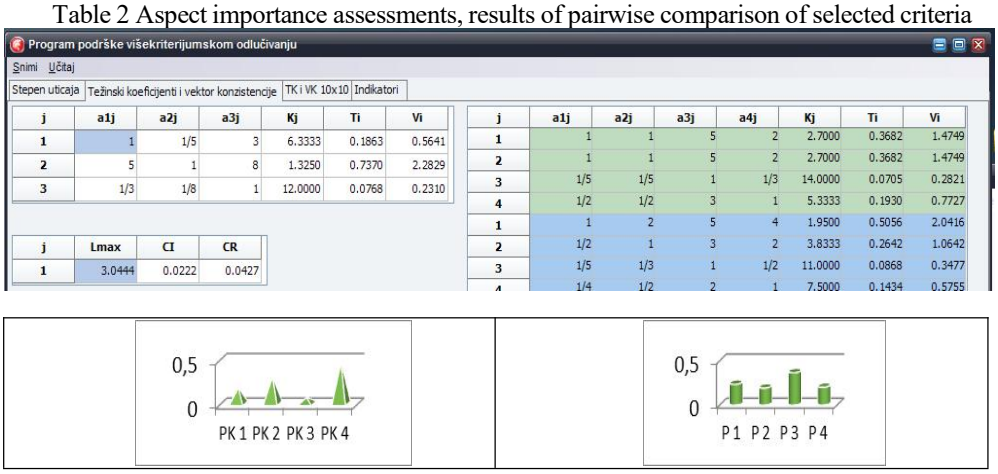

Figure 2 Importance of selected aspects of water quality disturbance from the energy complex

- ***Conclusion***

This paper reduces and comparisons the results from multiple energy complexes, Balkan countries.

Keywords*: energy complex, water management, ranking of water pollution effects*

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Experimental determination of energy efficiency in looped water supply networks

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Abstract

- ***Introduction***

This paper presents the study developed in order to determine the energy efficiency characteristic in looped water supply networks.

- ***Methods***

In order to analyse the network behaviour in different types of consumption variation, the network is connected to a computerized measuring unit, developed on a LabVIEW platform (National Instruments) that provides measurement, real-time display (graphical and / or tabular) of physical quantities collected from the sensors attached to the network.

- ***Results and significance***

Experimental determinations made have the purpose to analyse the permanent regime motion as a reference for the transitory regime in a ring type pipe network, for possible operating situations.

Based on the measurements made on the experimental stand, the flows on each section of the analysed ring network and the pressure in its nodes were determined. With the support of these values, it is intended to determine the dissipated power, and the dissipated energy, on the loop of the ring network

- ***Conclusion***

The physical phenomena study of water motion in pipe networks focused on ring networks, which are frequently encountered in local water supply networks as well as in irrigation systems or industrial installations .Conceptually, a representative loop was chosen for the hydraulic phenomena study. This loop can be a module for building a whole water distribution network.

Keywords*: energy efficiency, looped water supply networks, water distribution network*
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Integrated management - a basic component for building a quality system in construction

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Abstract

- ***Introduction***

From ancient times, mankind needed organization and coordination to be able to carry out its projects. In order to make impressive constructions such as the Great Wall or Egyptian pyramids, it was necessary for the activities to be organized and coordinated, with the primacy of being dependent on each other. Thus, over time, as requirements grew larger, it naturally emerged the necessity, development and improvement, of the skills of manager, coordinator, of a project team.

- ***Methods***

This article uses the method of the synthesis of the studied documents to demonstrate the necessity to implement integrated management. Thus, one can say that in Europe, the first transcript is the book "The Art of War," written by Chinese General Sun Tzu in the 6th century BC. The book was introduced to the West by a Jesuit, Father Joseph Marie Amiot, who translated it and made it known in Europe in 1772 as "The Thirteen Articles" [5]. The book is considered to be representative, and at present, in the field of Strategic Management.

Later, as a result of technological development, in the modern era, management emerged, for the first time, as science in the US. In this sense, the book of James Burnham, the "managerial revolution," published in New York in 1941. [4]

Integrated management is a complex management, a complex science that can contribute to the added value of a project.

- ***Results and significance***

Integrated management is a complex science, an optimal area where five important concepts are met: the concept of production (includes the requirements of society), the economic concept (representing the financial and banking environment), the legal concept, the concept of marketing (the sale of products) and, last but not least, the concept of coordination, the proper management of all the above-mentioned concepts.

In this way, the integrated management can lead to the achievement of sustainable products for the company, products with a high quality standard. Sustainability includes the environmental component, social component and economic component. Integrated and sustainable management can be a solution for the development of a future, healthy society

- ***Conclusion***

Integrated management is a solution for human society at present. Together with the quality standards (EN ISO 9001: 2015) integrated management contributes to the control of the manufacturing process and the production of high quality finished products.

Keywords*: integrated management, standard quality, sustainability*

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Modern concepts for constructive solutions in Dobrogea

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Abstract

- ***Introduction***

Human society, in its evolution, has forced the increase in quality requirements on the concept of "construction". Increasing the level of quality has, however, led to an increase in conventional energy consumption, both in the manufacturing process and later in the post-use process.

Thus, the necessity of conceiving and developing sustainable constructive systems has emerged to capitalize on the local energy potential of each region. In this context, the concept of "passive house" has also been developed.

The "passive house" as a whole is a constructive system that provides "a comfortable indoor climate without active heating and cooling systems" [1] and is customized for the region where it will be exploited in situ.

- ***Methods***

This article deals with the design of a passive house, located in the south eastern part of the Dobrogea region, in Romania, more precisely in the outlying city of Constanta. We will present the resistance structure, the architectural design, the installation systems together with the supply connections, in correlation with each other so as to meet the comfort requirements and the passive house condition.

Regarding the studied building, we will use the comparison method for comparing several parameters related to two distinct structural structures established for the strength structure. The compatibility between each structural system (strength structure) and the possibility of equipping with the related facilities will be analysed. The most reliable solutions for the energy supply of the building will be analysed. These solutions will be described.

- ***Results and significance***

The structure, thought in this paper, is intended to be a passive house model, specific to the Dobrogea region. The region is characterized by a climate where solar radiation, wind frequency regardless of the season and geothermal energy represent real potential for sustainable construction. The case study would like to present an alternative to the use of conventional energies.

- ***Conclusion***

Passive houses can be a solution for the future. They use alternative energy sources, materials and environmental friendly systems. The maintenance costs, during their existence, as well as the waste they generate, are lower compared to the costs of a similar classical building. In this way, although the costs for the basic investment may be higher, they are justified by the lower costs during the exploitation period.

Keywords*: passive house, geothermal energy, wind energy, thermal bridge, constructive system*

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Current state of the Romanian Black Sea environment

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Abstract

- ***Introduction***

This paper is an outline of the current state of the main components of the marine environment of the Black Sea in 2016. The data is part of the national Environmental State Report (http://www.anpm.ro/ro/raport-de-mediu).

- ***Methods***

The used methods were specific for each measured parameter according to the international requirements taking intio account the implementation of Water Framework Directive, Habitats Directive, Marine Strategy Framework Directive, Marine Spatial Planning, and local, national and European adaptation planning.

- ***Results and significance***

The seawater temperature at Constanta, during the 12 months of the analysed period was 1.49°C higher than the reference temperature (1959 - 2015). There is an increasing trend of 0.02°C/year throughout the period 1959 - 2016. Concerning the seawater transparency, the influence of the Danube in the northern part was strongly felt. The salinity ranged within the characteristic variability range of the Romanian coast, being influenced by the fresh water input. As far as eutrophication indicators are concerned, phosphate concentrations in coastal waters recorded in 2016 values close to those of the reference period of the 1960s, being only slightly higher. It was noted the risk of not achieving the target values for GES of Romanian Black Sea. The comparison with GES target values highlighted the moderate risk of not achieving good status in coastal and northern marine water bodies. The results of the investigations carried out in 2016 on heavy metals in water, sediments and biota show differences in distribution between different sectors of the Romanian seashore reflecting the potential impact of natural or anthropogenic pressures generated by coastal and offshore sources and activities. Total Petroleum Hydrocarbons (TPH) concentration indicated in 2016 a low level of pollution in seawater and a moderate level of pollution in sediments. In case of Polycyclic Aromatic Hydrocarbons (PAH), 78% of the values of individual compounds in water and 42% of total content the sediment exceeds the maximum admissible limit imposed by the current legislation, which shows a high level of pollution. Anthracene was the dominant compound in both water and sediment. In biota, concentrations of benzo[a]pyrene indicate a low level of pollution with PAHs. The biologic al components (phytoplankton, zooplankton, benthos) maintained the same tendency as in previous years.

- ***Conclusion***

The state and evolution trends of the Romanian marine and coastal environment were monitored in 2016 from the physical, chemical and biological point of view, compared to the reference period of 1960s and more updating data. The state of the marine and coastal in 2016 confirms the general trend of the slight improvement of the monitored parameters.

Keywords: *marine environment, eutrophication, contamination, biological components, marine living resources*

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Evolution of coclime service development in response to initial stakeholders engagement: Romanian Black Sea study case

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Abstract

- ***Introduction***

European coastal ecosystems are changing as a result of interactions between a number of drivers (overfishing, pollution, climate change etc.). These changes impact on human health, food safety and the future sustainability of sectors including aquaculture, fisheries and tourism. Stakeholders' engagement is crucial in transferring and translating scientific information to the wider audience. Climate forecasting is well developed and there is considerable activity in marine ecosystem impact modeling; however, a gap remains between the delivery of this information by scientists and its effective uptake by end-users and policy makers.

- ***Methods***

In this context, the CoCliME project aims to co-develop and co-produce a set of regionally focused climate services to address key impact areas including human health, aquaculture, fisheries and tourism across the regional seas of Europe. The developed services and associated decision support tools will empower and support vulnerable coastal sectors to accelerate adaptive decision-making and feed into key governance mechanisms such as the Marine Strategy Framework Directive, Marine Spatial Planning, and local, national and European adaptation planning.

- ***Results and significance***

As a first step, a baseline assessment is being performed in all case study areas, aiming to scope existing services and stakeholders that are involved in the regulation, or are affected by, harmful/toxic/pathogenic marine microbes. For the Black Sea case study, stakeholder mapping was performed and the identified actors were grouped according to their roles: decision maker, implementer, expert provider, influenced/affected. The areas covered include public health - bathing water quality, regulation of fishing activities, aquaculture, environmental regulation and permitting of all activities on land and at sea, weather and hydrological forecast, hydrographic mapping, water management, hydrotechnical protection, food safety, sanitary-veterinary regulations, water supply and waste water treatment plant management, tourism, harbour activity management, marine biology, conservation and protection of nature, education, and public administration.

- ***Conclusion***

The results from this baseline assessment will allow a better understanding how stakeholders can make better decisions about harmful/toxic/pathogenic marine microbes. It will help to lay the foundation for more detailed stakeholder engagement and data collection plans and timelines for the individual case studies.

Acknowledgement*:* The results herein presented were obtained in the frame of the project "Co-development of CLimate services for adaptation to changing Marine Ecosystems" (CoClime), funded through JPI Climate ERA4CS Joint Call (2017-2020).

Keywords*: climate services, marine microbes, co-development, engagement, stakeholder mapping*

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Analysis-based results on the waves model applications for the Romanian shelf

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Abstract

- ***Introduction***

The aim of a dynamic web-based support system, designed to enhance the forecasting of the marine and coastal waters, is to integrate numerical models with in-situ measured data, as well with remote sensing products.

- ***Methods***

The waves forecast on the Romanian shelf, posted on the ISWIM Project's website (http:iswim.rmri.ro) is developed based on the numerical weather forecast used in this study is obtained from the limited area model ALARO (Aire Limitée Adaptation/Application de la Recherche à l'Opérationnel), which runs operationally at the National Meteorological Administration in Bucharest since 1997. This deterministic numerical model is developed within ALADIN (Aire Limitée Adaptation dynamique Développement InterNational) and RC-LACE (Regional Cooperation for Limited Area modeling in Central Europe) consortia, Romania being a member of both.

ALARO model is integrated four times per day (00, 06, 12 and 18 UTC), using initial and lateral boundary conditions provided by the global model ARPEGE (Action de Recherche Petite Echelle Grande Echelle), having 6.5 km horizontal resolution and 60 vertical levels. This data are implemented on an operational system which has been implemented by NIMRD/ACTION since April 2016. The wave model has a horizontal resolution of 1.25 km, having as hydrodynamics forcing the wind data from ALARO Model.

- ***Results and significance***

The current work will present the results of a validation studies for the above mentioned waves model, together with certain aspect of its implementations for operational purposes in safety coastal navigation. The seasonal variations of measured waves emphasise a good correspondence between model and in-situ measured data.

- ***Conclusion***

Based on the comparison of model results and data collected at Mamaia bay, several implications on field data measurements will be emphasised for model application and validation within Western Black Sea Basin.

Keywords*: marine modelling, coastal waves, water quality, safety coastal navigation*

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Study on the quality of groundwater at the Natura 2000 Lunca Barcăului site – ROSPA 0067

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[2] The Basin Water Administration Crişuri Oradea, Oradea, Romania

Abstract

- ***Introduction***

In the context of increasing anthropic impact on the natural environment at local and global level, the present study aims to create a snapshot of the quality of the underground water from the Natura 2000 Lunca Barcăului (Barcăului Meadow), representative of the Natura 2000 network in Romania.

- ***Methods***

In this respect, exceedances of the acceptable limits for groundwater quality for 12 quality indicators were analyzed.

- ***Results and significance***

The results obtained may constitute a basic support for other scientific endeavors in order to preserve, protect and valorize the biodiversity specific to the protected areas.

- ***Conclusion***

In order to preserve, protect and valorize the biodiversity specific to the protected areas the results obtained may constitute a basic support for other scientific endeavors

Keywords*: grownd water quality, quality indicators, Narura 2000 site, biodiversity*

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Contamination of surface and underground waters by depositing hazardous waste or as a result of accidents

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[2] University of Belgrade, Innovation center of the Faculty of Chemistry, Belgrade, Serbia
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Abstract

- ***Introduction***

The depositing of waste, especially hazardous one, is a major problem in most Eastern European countries, and a particularly major one at the Balkans. This kind of waste is usually mixed with communal waste. Hazardous waste often contains substances such as mineral oils, organic solvents, heavy metals, compounds from the group of persistent organic hydrocarbons (POPs), and often medical and pharmaceutical waste. Also, the transition period in those countries has left behind obsolete technologies and derelict storages of hazardous waste.

- ***Methods***

On the other hand, accidents, including war ones, lead to an emission of various harmful substances into the watercourses. The destruction of industrial capacities, especially petrochemical and oil ones, as well as the production of artificial fertilizers, leads to enormous amounts of pollution of, among others, water resources and underground waters (In the case of the war events in Serbia, more than 500 000t of hazardous substances: oil hydrocarbons, strong acids and alkalis, mercury, vinyl-chloride monomers, PCB, etc).

- ***Results and significance***

The current war events in water-poor regions will similarly lead to grave consequences to the water quality. The biggest problem about war events is that there is no way to prevent the spread of pollution or conduct any kind of remediation procedure for a long time period, unlike peacetime accidents.

- ***Conclusion***

The examinations were conducted on various localities in Serbia, and the presence of toxic substances was determined. Figures 1, 2 and 3 depict some examples of the presence of some polluting substances in the underground waters in the industrial city of Pančevo after the destruction of a petrochemical complex and an oil refinery.

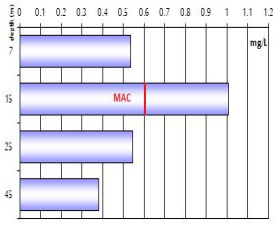

Fig. 1. Hydrocarbons conc. (C5-20)

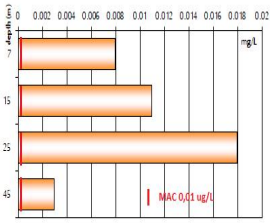

Fig. 2. PCBs conc.

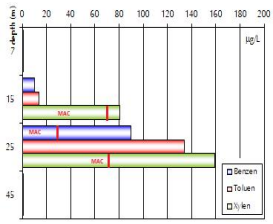

Fig. 3. BTX conc

Keywords: *waste, surface water and groundwater, contamination*

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Efficient use of water an important tool in minimizing environment and operational costs in Albanian breweries

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Abstract

- ***Introduction***

Water is the most important component in a brewery. In order to produce 1L of beer it needed a lot of water ranged from 4 to 10 L. The major part of this water is used for cleaning process of equipments (Cleaning in place system) and housekeeping.

A considerable amount of water is used for steam production air compressors, heat exchangers and cooling towers. Inefficient use of water as a raw material in a brewery can have environmental impacts.

- ***Methods***

Therefore, minimization of waste water should not only include the improved management and control of water discharges, but also an optimization of process water input. Environmental protection measures in a brewery were focused on efficient use of water and also on optimization of processes that consume significative water volumes.

- ***Results and significance***

Our work was focused mainly on optimization of water consume through conservation and recycling. The need to recycle water is becoming increasingly important.

One of the main factors limiting the potential for water recycling is the high level of Total Dissolved Solids (TDS) and particularly sodium, which is the main compound of cleaning chemicals used to maintain high hygienic and quality levels in the brewery.

- ***Conclusion***

Process optimization and the provision of the most productive technologies are essential to achieving water savings in a brewery.

Keywords*: water input, consume, conservation, recycling, water discharges*

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Communication criteria for conservation and sustainable use of bulgarian wetlands of international importance

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Abstract

- ***Introduction***

Wetlands are recognized as important landscape features for enhancing the resilience of the protected areas network, as natural water retention systems for functioning of the habitats and auspices to climate change. They are among the most endangered ecosystems while at the same time provide beneficial services to human well-being like food, resources and materials, mediation of extreme events, recreation and experiential learning. One of the instruments for their protection and management, stressed also in the Ramsar Convention, is the environmental communication that covers wide range of approaches, principles, strategies and techniques.

This research aims to develop communication criteria as a tool for conservation and sustainable use of ecosystem services of Bulgarian wetlands of international importance.

- ***Methods***

The methods of scientific analysis and synthesis were used. Different theoretical and practical sources of information were investigated. A characteristic of the Bulgarian Ramsar sites with their biodiversity was made and their communication facilities were interpreted.

- ***Results and significance***

As a result, appropriate criteria for promotion of the wetlands' importance and for educational work with visitors were identified. The environmental communication criteria for wetlands were structured in three main groups: human and material resources management, communication with the general public and direct interaction with tourists.

- ***Conclusion***

The Bulgarian Ramsar sites are of major importance for wild fauna and flora and host a range of habitats and species of Community interest that makes them moreover unique natural learning places. Therefore, a holistic communication approach for their sustainable use and conservation was suggested.

Keywords*: wetlands, ecosystem services, environmental communication*

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Chemical and physic-chemical parameters of the recultivated embankments of Maritsa – Iztok Mine in relation to development of the soil formation process

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Abstract

- ***Introduction***

The paperwork analyzes and generalizes the scientific data for the period of 1980 – 2016 concerning soil formation processes and restoration of the ecosystems on re-cultivated fields that had been destroyed by the biggest cola mine in Bulgaria.

- ***Methods***

To analyze how these processes flow under grass and woody vegetation, and agriculture use on the oldest embankment Zapad – Iztok of Maritsa – Iztok Mine have been completed: 1. Analysis of the ecological conditions of the reclaimed embankments – climate, natural soils and materials from the soil depots for reclamation; and 2. Analysis of chemical and physic-chemical properties of the embankments after biological reclamation with different soil formation period.

- ***Results and significance***

From the results of the study on the embankment materials of the oldest embankment Maritsa – Iztok have been made deductions about soils formation process under the influence of the grass and woody vegetation after 20 – 25 and 40 year of forest and agricultural reclamation.

- ***Conclusion***

Based on the study shall be developed a conception for a restoration of damaged terrains and broadly applicable technology for biological reclamation.

Keywords*: re-cultivation, soils, embankment, reclamation*

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Distribution of zinc in water, aquatic macrophytes and sediment of Skadar Lake, Montenegro

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Abstract

- ***Introduction***

Macrophites play an important role in the circulation of metals in many aquatic ecosystems. Emerged and floating plants mostly acquire metals through their roots while submerged aquatic plants absorb metals through both their roots and shoots. Emergent plants remove metals from sediment and water, while rootless plants absorb metals from water only. Once absorbed, the metals have a greater tendency to accumulate in some of parts of the plants, than uniform distribution in the entire body of the plant.

- ***Methods***

The determination of metal content by sediment fractions, the estimation of their bioavailability, the analysis of the relevant ratios of metal content in the sediment, water and macrophytes and its distribution in different plant tissues, may all indicate possible pathways of absorption, distribution and the potential for bioaccumulation. The aquatic macrophytes Phragmites australis, Ceratophyllum demersum and Lemna minor were used as bioindicator plant species in order to define contamination level by Zn in Skadar Lake (Montenegro). Plants, water and sediments were tested for the content of Zn at six locations around Lake Skadar in four different seasons of year.

- ***Results and significance***

In the waters of the lake the contents of Zn varied from 0.002 to 0.008 mgl-1. Zinc is present in the examined sediments of Lake Skadar with an average value of 76.1 mgkg-1 of dry sediment. Zinc is almost evenly, with few exceptions, deployed to reductabile, oxidabile and residual fraction sediments of Lake Skadar.

- ***Conclusion***

They are different seasonal variations in the concentration of Zn in the tissues of macrophytes. In P. australis, concentrations in all parts of the plant are growing from April to August and fall until to October. Parts of plant the L. minor follow the same trend, that is, the increase in concentration from August to October, and in the root and in the leaf. The content of Zn in both plants is higher in the root, and the smaller part is transferred to other organs. With C. demersum, most of the metal content is transferred to the leaf, where Zn concentration increases from April to June, decreases until August and grows until the end of the growth season.

Keywords: *Lake Skadar, zinc, Phragmites australis, Ceratophyllum demersum, Lemna minor*

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Classification of Northern Greece rivers (Thrace, East, Central & West Macedonia and Thessaly Regions), according their threatened fish fauna

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Abstract

- ***Introduction***

The freshwater fish fauna represents an important factor for the river ecosystems in Greece that are highly valued for their environmental, economic, and social importance. Nowadays, the environmental pressure upon the freshwater fish populations and their habitat in river systems had increased considerably. The aim of this study is to classify the rivers of the three Regions of Northern and Central Greece in relation to their sensitive and endangered species of their fish fauna that colonizes them, and thus the assessment of the overall risk faced by these vulnerable ecosystems.

- ***Methods***

In this paper it was recorded the freshwater fish fauna of the main thirty-seven (37) rivers in Northern Greece, in the regions of Thrace, East, Central & West Macedonia and Thessaly and it was considered the current protection status for each fish species according the E.U. Regulation for Ecotopes (92/43/EEC), the Bern's Convention, the IUCN 'Red List' of threatened vertebrates, and the Greek Red Book of fresh water fishes. Then their threats were categorized and the proper management strategies and legislation needs for its protection were specified.

- ***Results and significance***

According to the hierarchical classification, 3 clusters of rivers were created. The results include elements of the average profile of each group.

- ***Conclusion***

According to these will be the further management of each group with different management measures for each one.

Keywords*: classification, rivers, threatened fish species, protection status, Greece*

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Classification of Northern Greece lakes (Thrace, East, Central & West Macedonia and Thessaly Regions), according their endangered fish fauna

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Abstract

- ***Introduction***

Lakes are very important ecosystems and nowadays accept many pressures from human interventions and from the deterioration of ecosystems that inhabits. The fish fauna of these ecosystems is a very important parameter for both their conservation and also for their rational and environmental friendly management and fishery. The main purpose of this study is, the classification of the lakes according to their fish fauna and the category of 'risk' in relation to the legislation that concerns and protects them in each administrative Region, as the regions of Thrace, East, Central & West Macedonia and Thessaly in Greece.

- ***Methods***

In this paper was recorded the fish fauna in the eighteen (18) most important lake ecosystems in the above administrative Regions. It was verified the protection status for each one of the fish species recognized there, according to the Red List of IUCN, the Greek Red Book, the Berne Convention and the Directive 92/43/ of EEC. It was evaluated the contribution of the number of species in relation to their classification under their protection status by ecosystem and region area in Greece and for the total study area in Northern and Central Greece.

- ***Results and significance***

According to the hierarchical classification, 4 clusters of lakes were created. The results include elements of the average profile of each group.

- ***Conclusion***

According to these will be the further management of each group with different management measures for each one.

Keywords*: classification, lakes, fish fauna, protection status, Northern Greece*

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Fish stocks in Black Sea: from policy to action

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Abstract

- ***Introduction***

The purpose of the study is to review the problems related to the fisheries management in Black Sea and to propose a possible solutions in view of the fluctuating stock dynamics and regional policies in place.

- ***Methods***

Analysis of existing policy measures were performed using legislative basis in the Black Sea countries and EU legislation in the field. Long-term stock dynamics of actively exploited stocks were analysed and presented graphically.

- ***Results and significance***

One of the very critical issues not only in the Black Sea region is the lack of comprehensive information concerning the fishing activity, catch quantities, and composition and how exactly it affects the current state of the fish stocks. There are a number of techniques which have been and currently are in place for recording, evaluating, controlling and monitoring of the fishing activities as well as a number of surveys of the current state of the fishing stocks have been performed. The analysis of data collected shows that it is needed to put efforts in both directions:

- Recovery and sustainable development of the fishing stocks to targeted levels of abundance, defined by the scientific advice;
- Limitation of the fishing effort to the optimal levels to ensure the targeted levels of abundance, defined by the scientific advice;

- ***Conclusion***

Nowadays, most of fish stocks in Black Sea are in the state of overexploitation, some of them are nearly to depletion. Only one stock, of sprat is considered sustainably exploited. One of the main aims of Common Fishery Policy of EU is to undertake protection measures in order to prevent the over exploitation of the fish stocks. These measures tend to mitigate the impact on the fishing activities, which endanger reproductive capacity or directly put in jeopardy the fish stocks. Many fish stocks in EU waters are out the safe biological limits. The recovery of the stocks probably will take more than expected in the long run.

Keywords*: Black Sea, fish stocks, measures, biological limits, recovery*

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Evaluation of the chromium and nickel containing in the stalks of phragmites australisas an indicator of water pollution of Ohri Lake by heavy metals

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Abstract

- ***Introduction***

The study was carried out during 2015 and has assessed the water pollution by heavy metals, such as Chrome and Nickel, in three water areas of the Ohrid Lake: a) at the entrance of the city of Pogradec (boat hull), b) the area of Guri Kuq and c) at the Lin village area.

- ***Methods***

Results showed that the average Chromium content (Cr, mg / kg) in the stalks of the cane, for the spring season, according to the three sampling areas was 0.88 ± 0.496 mg / kg; 1.65 ± 0.547 mg / kg and 0.61 ± 0.365 mg / kg, respectively. Meanwhile, the corresponding Nickel content in the stalks of the cane, according to the three sampling stations were: 5.31 ± 0.0.495 mg / kg; 6.98 ± 0.547 mg / kg and 1.83 ± 0.365 mg / kg.

- ***Results and significance***

Analyzes of the content of two heavy metals in the stalks of the cane plant were repeated in the autumn season. The average values for the Chromium content, according to the three sampling areas were; 1.4 ± 3,823; 3.5 ± 3.161 and 1.13 ± 0.441 and for the Nickel content we got the following values: 8.63 ± 0,346; 12.41 ± 1.228 and 2.53 ± 0.356 accordingly.

Commenting on the results of the analysis can be pointed out that the highest content of two heavy metals has been proven in the cane plant tissue (Phragmitesaustralis) which populated the nearby shore of Lake Ohrid in the Guri i Kuq area. In this area has been operating in the past an enrichment plant for the iron-nickel mineral. Heavy metals content at moderate levels has been found in the shore area of the waters lake at the entrance of the city of Pogradec. Source of pollution may be urban discharges and the presence of fuel distributors.

- ***Conclusion***

The area less polluted results the shore of the lake near the village of Lin. The tests have provensignificant increase in the pollution of Lake Ohrid chrome and nickel in the fall of autumn compared to that of spring, especially for the Guri i Kuq areas and the entrance to the city. The reason may be the intensification of tourist activity during the period June-August.

Keywords: *water pollution, heavy metals, OhridLake, Phragmites australis*

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The impact of pathogenic microbes of the water and the mollusca *Mytilus galloprovincialis* in the Butrinti Lake

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[2] Food Safety and Veterinary Institute (FSVI), Albania

Abstract

- ***Introduction***

In Albania, the bivalve mollusc farming industry has become particularly important. The nutritional quality of mussels depends on the area and water in which they are cultivated. Therefore, the microbial water and mussel rating that grows on it is an indicator of quality and food safety for this product.

- ***Methods***

The study is focused on the evaluation of the microbial load (E. coli, Vibrio Cholera and Vibrio parahaemolyticus) of Butrint Lake water in southern Albania and the *Mytilus gallaprovincialis* mussel cultivated in this lake. Rapid rural urbanization has served as a source of fecal contamination of lake water. The study includes two periods, summer and spring 2017-2018, three mussel cultivation stations, a total of 9 mussel samples and 21 water samples. For Escherichia coli, first was used medium MMGN (mineral modified glutamate Medium Base), with 3 dilutions in 5 tubes. The tubes were then incubated at 37 ° C for 24 hours. From the tubes where the color changed (gram + reaction) the material was taken and was passed to the TBX Agar, and incubated at 44 ° C for 24 hours.

- ***Results and significance***

The results were interpreted according to the MPN table referred ISO 7218. For Vibrio cholera & Vibrio parahaemolyticus were used mediums, ASPW (Alkaline Saline Peptone Water), TCBS (Thiosulfate Citrate Bile Sucrose Agar), SNA 1% (Saline Nutrient Agar). From the medium SNA 1% oxidase (+), material was inoculated on TSI at 37 °C for 24 hours. For Vibrio cholera & Vibrio parahaemolyticus analysis are based on ISO/TS 21872-1: 2007 Microbiology of food and animal feeding stuffs -- Horizontal method for the detection of potentially enteropathogenic Vibrio spp. -- Part 1. Microbiological analysis has shown that the concentration of E. coli bacteria in the Butrint lagoon is much higher than the level considered safe for direct human consumption. These results rank the Butrint Lagoon in Grade B (230-4600/MPN/100gr mollusc) where mussels must be subjected to purification before being traded. Resulted that there was no presence of Vibrio cholera but had samples with Vibrio parahaemolytic. Also, the physical-chemical parameters such as temperature, pH, salinity and oxygen in the water were evaluated during the study period.

- ***Conclusion***

The lake water trophy has also been considered. Since bivalve mussels are also a carrier of pathogenic bacteria, the assessment of their presence continually serves as a preventative measure to avoid risks to the consumer.

Keywords*: Microbial water, Mytilus gallaprovincialis, E. coli, Vibrio Cholera, Vibrio parahaemolyticus*

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Analysis and prevalence (Pi %) and aquaculture intensity investment (Ii) in case of touch of three sub populations of Chub (Squalius Cephalus) from the parasit of Dactzlogzrus Sphzrna (Monogenea)

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Abstract

- ***Introduction***

The chub of Ohrid Lake waters is parasited by three Monogeneans helminths (Paradiploy oon ergensi, Dactzlogzrus sphzrna and D.folkmanovae).

- ***Methods***

The parasitological assessment noted that the average value (M) of the prevalence of invasion of the affected individuals, calculated based on the total number of individuals in the sample that was caused by the monocytic Dactzlogzrus sphzrna in three subpopulations of S.cephalus was; the subpopulation of Lin 21.29%, the Tushemisht subpopulation 18.08%, and the subpopulation of the Pogradec city (Bankin area of the boat) 8.43%.

- ***Results and significance***

The invasion dynamics that caused this parasite for the March-October period was the same in the three subpopulations living in waters of Lake. The changes were only quantitative. The highest average value of invasion intensity (number of parasites in a fish) we have found in the chub flocked of Lin area (M = 5.3).

In the waters entering at the area onear the Pogradec city, we found the lowest value of this parameter (M = 1.95). Despite differences in average values of Ii, between three chub water subpopulations that were affected by D.sphzrna poisoning, ANOVA variance analysis did not show any significant changes to this parameter.

- ***Conclusion***

However, we have to admit that the largest number of parasites in a fish is found in the less water polluted areas of Ohrid Lake.

Keywords*: water pollution, the chub, Ohrid Lake, prevalence, invasion*

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Water, nature, Techirghiol – long-term therapeutic benefits for patients with degenerative low back pain

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Abstract

- ***Introduction***

Techirghiol Lake is located in Dobrogea, in a region with a mean altitude of about 200-300 m, situated between the lower Danube River and the Black Sea. The lake is in a temperate continental climatic area with an important influence of the sea. The depression occupied by the lake was formed as fluvial-maritime lagoon during the last glacial periods. The water of the lake has an important characteristic due to the variable concentrations of salt, which varies between insignificant salinity to 60g/l, even 85g/l. The average annual temperatures range between 110C along the Danube to 11.80C on the coast and less than 100C in the higher parts of the region. The sapropelic mud, among the salty water, is an important natural factor that has a high curative importance.

- ***Methods***

The natural factors from Techirghiol area are extensively researched in various studies, especially in terms of therapeutic benefits for the patients treated in the Balneal and Rehabilitation Sanatorium of Techirghiol. The aim of our study is to evaluate the impact of hydro-kinetoterapy in the salty water of Techirghiol Lake, during summer time, on patients with degenerative low back pain. The patients were divided into 2 groups, one group had hydro-kinetoterapy in the lake, and the other group had no kinetotherapy. Both groups had electrotherapy and massage.

- ***Results and significance***

The patients were evaluated paraclinical and clinical before and after 2 weeks of therapy. We evaluated the serum levels of an important neurotransmitter involved in the transmission of nerve impulses which also interfere in affective processes (such as depression, anxiety, mood disorders).Each patient had to complete before and after the treatment a questionnaire regarding lumbar disability.

- ***Conclusion***

The specific treatment among the natural factors of the Techirghiol Lake improves the quality of life of patients with degenerative lumbar pain.

Keywords*: balneal treatment, degenerative low back pain, Black Sea, Techirghiol, mud, research*

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Does composition of tap water influence prevalence and evolution of nephrolithiasis in Constanta County?

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Abstract

- ***Introduction***

Renal lithiasis is a frequent health problem, mainly in developing countries. There are a lot of studies, in the past decades, demonstrating that environmental factors, including hardness of drinking water, are influencing population's health. Most of the studies concerning the relationship between water hardness and malignancy are discordant, but the majority of them are revealing higher incidence rates of cholelithiasis, urolithiasis, arthropathies and atopic dermatitis in comparison with the regions with softer water.

- ***Methods***

We created a retro-prospective study, that included 135 patients (M:F=1.5:1; median age 44.2±9.7 years) admitted in the Nephrology Department from the Emergency Clinical Constanta County Hospital, mainly for complicated renal lithiasis. Data about drinking water hardness, obtained from the Environmental Protection Agency and Public Health District Authority were added to those from patient monitoring files and paraclinical investigations, i.e. 24-hours urine chemistry.

- ***Results and significance***

The aim of our study was to study the potential influence of drinking water properties, like hardness, on urinary chemistry in hospitalized patients with complicated, recurrent nephrolithiasis. The 24-hour urine calcium, magnesium, and citrate levels were increased in our patients, but with no statistical changes were in oxaluria levels, uric acid, pH, or volume. The most frequent complications of nephrolithiasis were: acute pyelonephritis (64,4%), acute kidney injury (48.2%), urosepsis (28.1%), and severe, persistent haematuria (21,5%). More than 50% of the patient required urological interventions (ureteral stenting, ureteroscopy, cystoscopy, etc). The most frequent associated morbidities were: cardiovascular, mainly arterial hypertension (55.6%), osteoarthritis (43.7%) and atopic dermatitis (26.7%). We noticed that the prevalence of these comorbidities is more frequent, according to their group of age ($p<0.005$). Mortality in our study group was 5.2%, mainly caused by septic shock.

- ***Conclusion***

A certain correlation between the regional water hardness and recurrent nephrolithiasis, as well as cardio-vascular, cutaneous and articular diseases is really difficult to be done. But it is obvious that electrolytes concentrations from tap water can induce important changes in urinary electrolytes and increases the risk of urinary calcium stones, especially when combined with genetic predisposition or local affections.

Keywords: *nephrolithiasis, water, treatment outcome, diet*

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Pollution prevention in paracetamol industry

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Abstract

- ***Introduction***

Chemical synthesis processes of the pharmaceuticals industry produce wastewaters. In plant controls are important the final wastewater quality. In this study, a small-scale pharmaceuticals plant producing paracetamol (PC) in a batch process with paraaminophenol and acetic acid anhydride as raw materials was investigated to assess pollution profile. Cristallization and purification steps were follow on solid product. Wastewater source is the crystal washing waters of the precipitate. The amount of wastewater varies between 2 - 3 m^3/tone product/1 batch a day and the plant work 5 days a week.

- ***Methods***

Wastewater samples (2 L saturated solutions of PC) were concentrated and solid residual mass were analysis by Fourier Transform Infrared Spectroscopy. FTIR spectra were recorded in IR range (4000 cm-1 - 400 cm-1 on a MB 3600 – AAA Fourier spectrometer for KBr pellets (1 mg sample with 100 mg KBr). 7 standards of PC (Assay 99.9%) with varying concentrations in KBr pellets were prepared and run on FTIR. Specific region of 1630 - 1530 cm-1 for PC was selected for best results of calibration curve.

- ***Results and significance***

Wastewaters (Sample 1, Sample 2, and Sample 3) characterisation are: pH1 = 7.2; pH2 = 6.96; pH3 = 6.80; COD1 = 1650 mg/dm3; COD2 = 162 mg/dm3; COD3 = 660 mg/dm3; TOC1 = ND; TOC2 = 60 mg/dm3; TOC3 = 320 mg/dm3; TDS1 = 1160 mg/dm3; TDS2 = ND; TDS3 = 6295 mg/dm3; PC1 = 1000 mg/dm3; PC2 = 100 mg/dm3; PC3 = 600 mg/dm3.

Paracetamol is part a COD, the values of total COD is approximately 1650 mg/dm3 for first sample and 660 mg/dm3 for third sample, more than value (500 mg/dm3) of NTPA002/2005.

pH it is in standard domain 6,5 8,5 (SR ISO 10523-97).

TDS is more than 350 mg/dm3 as standard limit TDS1 = 1160 mg/dm3 and TDS3 = 6295 mg/dm3

- ***Conclusion***

Organic matter was not the only problem with wastewater, other parameters (sulphate, nitrate etc) must be accounted for in satisfying the discharge standards. Further studies are required to develop the approaches and to provide more information in the field.

Keywords*: wastewater, paracetamol industry*

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Water quality in pharmaceuticals industry

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Abstract

- ***Introduction***

Water quality is essential to human health, social and economic development, and the ecosystem. Societal and environmental pressures over recent years have led to a growing movement for industry to reduce its wastewater and to treat it before discharge. Typically, water quality is determined by comparing the physical and chemical characteristic of a water sample with water quality guidelines or standards. In this study wastewaters of codeine plant were evaluated and discussed.

- ***Methods***

Wastewater samples (2 L saturated solutions of pharmaceuticals) were concentrated and solid residual mass were analysis by Fourier Transform Infrared Spectroscopy. FTIR spectra were recorded in IR range (4000 cm-1 - 400 cm-1 on a MB 3600 – AAA Fourier spectrometer for KBr pellets (1 mg sample with 100 mg KBr). 7 standards of PC (Assay 99.9%) with varying concentrations in KBr pellets were prepared and run on FTIR. Specific region of 1630 - 1530 cm-1 for codeine was selected for best results of calibration curve.

- ***Results and significance***

The reported data on regular monitoring included: - measurements in influents and effluents to wastewater treatment plant, as well as in sludge; - concentrations observed in rivers and other inland water; - concentrations of pharmaceuticals observed in compartments of the marine environment such as water, sediment and biota. Pollution prevention measures such as take-back of unused medicines by pharmacies should be applied in countries where such systems are not yet in place, in order to reduce the disposal of unused medicines via solid waste or wastewater. Educational campaigns should be carried out to increase the awareness of the public on correct disposal of pharmaceutical waste. Eco-labelling of pharmaceutical products can help doctors, pharmacists and consumers to consider environmental perspectives when choosing medication.

- ***Conclusion***

Decreasing the total consumption of pharmaceuticals also reduces their discharge with treated or untreated wastewater.

Keywords: *wastewater, pharmaceutical / codein industry*

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Study on the microbiological contamination of the walls in the heritage buildings

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Abstract

- ***Introduction***

In order to establish the technological solution for control the humidity in the walls, it is extremely important to know the causes that led to the degradation of the building, subsequently establishing the technological solution to be used to eradicate humidity from foundations and walls.

- ***Methods***

Establishing the execution technology is closely related to the preliminary investigation, so physicochemical and microbiological investigations play an extremely important role.

The investigated objective is Wing C of"1 Decembrie 1918" University of Alba Iulia.

- ***Results and significance***

Several archaeological, architectural, historical, cultural interdisciplinary researches have been carried out on this building and on the degradation of the masonry.

- ***Conclusion***

The paper highlights the importance of determining the microbiological contamination of the walls in order to establish the rehabilitation technology.

Keywords*: cultural heritage building, microbiological degradation*

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The influence of newly synthetized transition metal complexes based on pyrazole derivatives on the inhibition *Botryosphaeria dothidea* of under laboratory conditions

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Abstract

- ***Introduction***

Based on data found in literature about synthesis and characterisation of some pyrazol derivatives and some significant transitional metal complexes which have practical application in pharmacy, agriculture and environmental protection, [1-6] this research analyses influence of the 3,5-Pyrazoledicarboxylic acid monohydrate(HL) as are ligand and newly synthetised two Cu(II)complex with diferent structure and Ni(II) complex with (HL) as ligand on inhibition of pathogenic fungal mycelium *Botryosphaeria dothidea* with causal agent of olive fruit rot in Montenegro.

- ***Methods***

The activity ligand and of all compounds, in five different concentrations, ranged from 0.12 to 0.0075%, were tested for fungi B.dothidea in laboratory condition on PDA nutrient media.

- ***Results and significance***

Obtained results were compared with the commercial fungicide with active ingredient pyraclostobin that belongs to pyrazole derivates.

- ***Conclusion***

All examined compounds showed a significant inhibitory effect comparing to the control sample.

Acknowledgments: The autors are grateful to the Ministry of Science Republic of Montenegro on financial support through the project BIOEXTRA.

Keywords*: 3,5-Pyrazoledicarboxylic acid monohydrate;Botryosphaeria dothideabiological researches, active fungicide substances, rottingtreesdisease*

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The examination of potential fungicidal activity of Ethyl-3-(trifluoromethyl)-1H-pyrazole-4-carboxylate and Ethyl-1-(4-nitrophenyl)-5-(trifluoromethyl)-1H-pyrazole-4-carboxylate on fungus Phomopsis viticola Sacc under laboratory conditions

Željko Jaćimović [1], Nedeljko Latinovic [2], Jelena Latinović [2], Milica Kosović [1], Mia Vlahović [1], Vlatko Kastratović [3]

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Abstract

- ***Introduction***

Based on data found in literature about synthesis and characterisation of some pyrazol derivatives and some significant transitional metal complexes which have practical application in pharmacy, agriculture and environmental protection, this research paper analyses influence of pyrazole derivatives Ethyl-3 -(trifluoromethyl)-1H-pyrazole-4-carboxylate and Ethyl-1-(4-nitrophenyl)-5-(trifluoromethyl)-1H-pyrazole-4- carboxylate on the mycelium inhibition of plant pathogenic fungus Phomopsis viticola that causes Phomopsis cane and leaf spot, a very significant grapevine disease that is common in montenegrin vineyards.

- ***Methods***

Chemical inhibition of Phomopsis cane and leaf spot disease of grapevine has important practical significance, and it is mainly focused on treatments at the beginning of vegetation with purpose to reduce fungal infections.

The compounds were applied in five different concentrations.

- ***Results and significance***

Obtained results were compared with the commercial fungicide whose active substances pyraclostrobin and metiram belong to pyrazole derivatives.

- ***Conclusion***

Both examined compounds expressed weak effect on mycelial growth.

Keywords: *Pyrazole derivatives, active fungicide substances, Phomopsis viticola*

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Prey preference of the long-snouted seahorse (*Hippocampus guttulatus* Cuvier, *1829*) at the Romanian Black Sea coast

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Abstract

- ***Introduction***

The long-snouted seahorse is a representative species of the Romanian coast, due to its charismatic appearance and extraordinary biology. In Romania, the first experiments conducted on the breeding and rearing in captivity of seahorses were carried out by NIMRD "Grigore Antipa and the results have shown that the breeding and subsequent rearing of these fish in captivity is feasible. However, the major drawback in rearing H. guttulatus was supplying the most appropriate diet for the fry, as many individuals died of starvation before reaching maturity. The current research aimed at the examination of the gut content of wild seahorse specimens, in order to determine the prey preferences of the species.

- ***Methods***

For the gut content analysis of wild specimens, individuals were collected from the Romanian coast. Specimens were dissected and guts were removed. The number of empty and full guts of the specimens was recorded. The prey items were identified to the lowest possible taxonomic level and assigned to different prey categories such as Amphipoda, Isopoda, Copepoda etc. The qualitative analysis consisted in the identification of the food components found in the fish's gut. The quantitative method consisted in numerical analysis (frequency of occurrence FO% and numerical abundance NO%).

- ***Results and significance***

The dominant prey group identified in the gut content of H. guttulatus along the Romanian Black Sea coast was represented by Balanus cypris larvae (meroplankton) (FO% 70), followed by amphipods (FO% 57.14) Isopoda (FO% 25) and Copepoda (FO% 21.42). The other non-identified prey items could be represented by Mysid crustaceans or Decapod crustacean larvae. Out of the total guts investigated, only two were lacking any prey, while all other contained, in different shares, all the major groups identified.

- ***Conclusion***

The dominance of one group or the other is closely related to its availability in the environment at a certain moment. Thus, seahorses, as opportunistic predators, will preserve energy by selecting the largest and most available prey items. This is why it is not by chance that Balanus larvae, which are abundant in areas with hard substrate, were identified in large numbers in the guts of seahorses sampled in the southern part of the Romanian coast. Further investigations will be performed on a larger number of specimens, in order to reveal more correlations between prey preference, habitat type and prey availability.

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Keywords*: feeding, gut contents, long-snouted seahorse, prey availability, zooplankton*

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Measures for preserving the morphological status of the Black Sea seaside

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Abstract

- ***Introduction***

Dobrogea –Litoral Water Basin Administration manage state public water and water management infrastructure consisting of storage lakes, flood defenses, canals, inter-basins, water intakes and other specific works, as well as the infrastructure of national hydrological, hydro geological and water monitoring the quality of water resources in our heritage for the purpose of knowledge and the unitary management of surface and underground water resources

- ***Methods***

A particularly important component of the natural environment is the Black Sea waters and beaches. The major problem identified in the Romanian Black Sea coast line is the severe erosion. In order to identify the critical areas, prior to the implementation of the coastal erosion protection project, was elaborated the "Master Plan for the protection and rehabilitation of the coastal area".

Protection and rehabilitation of the coastal area is divided into 2 phases:

- In December 2015 works of the project "Protection and rehabilitation of the southern part of the Romanian Black Sea shoreline – Phase I (2012-2016)" were completed, in accordance with the approved quantities and indicators.
- "Works against coastal erosion phase II (2014 - 2020)".

- ***Results and significance***

Results: Expansion of beaches from several sectors; Fighting the crash of the cliffs; Improve water quality near the shore; Fighting the phenomenon of progressive retraction of the waves under the action of waves.

- ***Conclusion***

The overall objective of the project is the implementation of measures to protect and rehabilitate the beach against the risk of accelerated erosion.

Keywords*: water management, coastal erosion, measures to protect and rehabilitate of coastal area*

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Section B:

AWI: Agriculture and Water Issues
HWR: Hydrology and Water Resources
NHRA: Natural Hazards and Risk Assessment

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Subsurface drainage efficiency measured in a period of 20 years

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Abstract

- ***Introduction***

In a field trial with different mineral nitrogen doses (0, 100, 150, 200, 250 and 300 kg Nha-1) drainage discharge was measured in the period from October 1997 to December 2017. This paper present the results of subsurface pipe drainage efficiency and also gives the comparison of measured water surpluses with calculated surpluses, based on Thornthwaite ET model. The experimental station soil type is defined as Stagnosols, with Ach+Ecg – Ecg – Btg sequence of soil horizons. Because of water stagnation in soil profile drainpipes were installed at the average distance of 20 m.

- ***Methods***

The trail was set up so that the area of each fertilizing treatment embedded two drainpipes, in their full length. Altogether there were 20 drainage pipes monitored over the period of 20 years (1998 – 2017). Drainage outflow was measured manually on a daily basis during the periods of outflow. Crop sequence at test field included corn, winter wheat, oilseed rape and soybean. Trial treatments were: 1.Check–unfertilized, 2. N0 PK, 3. N100 PK, 4. N150 PK, 5. N200 PK, N250 PK, N250 PK + Phosphogypsum, N250 PK + Zeolite tuff + CaCO3, 9. N300 PK and 10. Black fallow. The trial plot size was 30x130 m (3900 m^2) for each treatment, as conditioned by the drainpipe spacing and their length (130 m).

- ***Results and significance***

Average long-term (1965-1990) precipitation mean for the nearest meteorological station amounts to 865 mm per year. In the period of investigation (1998-2017) average precipitation measured on the exact field location is 793 mm per year. Average water surplus according to the Thonthwaithe evapotranspiration model is 253 mm per year. Average measured drainage outflow for the period of research was 118 mm per year. Annual variation of measured volume of drainage varied over time from minimum 0 mm in year 2011 to maximum 244 mm in year 1999.

- ***Conclusion***

Based on a data collected from 20 year period, average drainage outflow was 118 mm and it is 14.8 % of the average precipitation measured at the experimental field. In comparison with water surplus calculated by Thornthwaithe ET model, pipe drainage removed 46.5 % of the excess water from the field.

Keywords: *Subsurface drainage efficiency, water surplus, drainage outflow*

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A proposed index for drought characterisation: Drought Power Index (DPI)

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Abstract

- ***Introduction***

Drought is a main water-related natural hazard due to its features, sense and effects to all sectors. According to climate change scenarios, drought hazards are expected to be more devastating especially in arid and semi-arid regions. Drought characterisation is essential to be aware of expected negative effects of droughts as well as to devise water management plans including possible mitigation measures. To this end, many drought indices have been developed for drought analysis, one of which is the Standardised Precipitation Index (SPI) that is widely used worldwide.

- ***Methods***

In this study, a new drought index is proposed, namely the Drought Power Index (DPI), based on SPI with orientation by reliability-resiliency-vulnerability (RRV) concept. The use of RRV approach with the SPI time series empower the drought characterisation by considering the frequency of drought event, drought recovery period as well as the severity of droughts-once a drought has occurred. Since the drought is identified as an unfavourable phenomenon, the DPI ranges from 0 to 1 where the higher values indicate higher drought devastating features (probability, duration and extremity of drought) and vice versa. The proposed approach is illustrated with reference to the Tigris-Euphrates River Basin, Turkey. The long-term (1970-2017) monthly precipitation data of 8 meteorological stations under the operation of General Directorate of Meteorological Services of Ministry of Forestry and Water Affairs are used in the study. The monthly, seasonal and annual SPI time series, which were later used for calculations of DPI, were obtained by the use of SPI_SL_6 software.

- ***Results and significance***

The study revealed that there has been an increasing trend in DPI values in the basin, especially after 1993.

- ***Conclusion***

It is concluded that the DPI is a valuable indicator for (i) spatially and temporally evaluation of drought characteristics, (ii) analysing meteorological, agricultural and hydrological drought severity with its coherent capability with SPI, (iii) ranking the regions in accordance with the drought vulnerability conditions.

Keywords: *Drought, reliability, resiliency, vulnerability, Tigris-Euphrates River basin*

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A drought management model for continuous agricultural production compatible with changing climatic conditions, a case study of Kucuk Menderes Basin

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Abstract

- ***Introduction***

It is well known that the stress conditions caused by climate change will be an effect on agricultural productions. Climate scientists have determined that climate change will be very effective in Western Anatolia regions in Turkey, a very important part for agricultural production in Turkey. The lack of rainfall and increased temperature and evaporation rate will cause the amount of the irrigation water to decrease. Irrigated agricultural crop pattern will be forced to change to rain feed crops with low fertility rate. Another factor that forces the agricultural crop pattern change is the expected degradation in the soil quality parameters due to insufficient salt washing of the soil and excessive evaporation. It is necessary to plan the production of crops in accordance with the expected stress conditions in the agricultural lands and to manage the drought. The effects of climate change will be different in each region according to their topography and geomorphological structure.

- ***Methods***

This project aimed to map the stress conditions that may occur in terms of agricultural lands and to plan the precautions to be taken separately at the regional level. In terms of water and drought management, it has been adopted that the study is a basin-based. Kucuk Menderes Basin in Western Anatolia was chosen as the project area. The spatial effects of climate change are determined using three integrated models.

- ***Results and significance***

Within one of these models, the effects of changing climatic conditions are mapped at sub-regional levels of the basin for the next 10 years periods until 2100. Soil quality deterioration is also mapped within the second model. Soil samples were taken in each 4-month periods and the changes of soil salinity were monitored. In the third model, the types of field and horticulture plants with anticipated expected stress conditions were determined for next 10 years periods. It is estimated that cultivation of the field crops will be very difficult in about 12% of soils of the basin at the end of the next 20 years because of soil degradation. As a result, it is proposed to establish plant adaptation stations compatible with the expected stress conditions so that food production in the basin can be maintained.

- ***Conclusion***

It has been determined that expected stress conditions will result in reduced varieties of crops Accordingly, a significant portion of food production needs to be done in the greenhouse in order to use water efficiently.

Keywords*: draughtiness, climate changes, agriculture, soil degradations*

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Research on surface runoff for different crops in the Preajba Experimental Center, Gorj County

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Abstract

- ***Introduction***

The paper aims to present the monitoring and quantification of soil losses through runoff as a result of the erosion phenomenon. The experimental results obtained during June - October 2009 on the standard plots for runoff and erosion control are presented.

- ***Methods***

The experimental scheme was placed on the Luvosol from Preajba Experimental Center for Grassland, Gorj County, with a 5% slope at an altitude of 305 m. The experiment consists of nine variants, five replications, each experimental plot having 100 m2 (4 m x 25 m). In order to highlight the crop protection capacity in mitigating the erosion phenomenon, the nine experimental variants were placed as follows: variants 1 - 3 on natural grassland, variants 4 - 6 on sown grassland and variants 7 - 9 on maize crop. In the downstream part of the plot, a system for runoff collecting was built in each plot, consisting of a concrete triangle ending with a collecting tube draining into a collecting puddle. Monthly, the runoff water and the soil trained by it from the plot was collected in the collection puddle. The volume of collected water was filtered, the eroded soil remaining on the filter paper, and being weighed in order to calculate the soil loss on the plot and then reported per hectare.

- ***Results and significance***

The results of the studies carried out highlight that the precipitation volume was 202.6 mm (2,026 m3/ha) during the observation period, no rainfall occurring in September. From this volume of water, 3.23 - 7.22 m3/ha was the runoff on the slope, the highest liquid volumes being recorded in the maize variants (5.79 - 7.22 m3/ha), while the smallest values in sown grassland variants (3.23 - 4.06 m3/ha). The total soil losses are between 0.82 - 1.66 t/ha, lower in the natural and sown grassland and higher under the maize crop.

- ***Conclusion***

In conclusion, the highest surface runoff values were recorded in June, when rainfall quantity was 64.2 mm. As regarding the plants used in the experiment, natural and sown meadows are good protective crops, while maize crops do not contribute to reducing soil and water losses through erosion.

Keywords*: water, soil, runoff, erosion*

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Investigations of agronomical and physiological features of plant genetic resources influenced by deficit irrigation

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Abstract

- ***Introduction***

The significant climate changes registered over the past few years demonstrate the vital importance of finding workable solutions allowing us to preserve our natural resources (especially vegetal genetic resources, land, and water) and ensure a steady and nutritious food supply to all people. The use of genotypes with tolerance at biotic and abiotic stress might represent an alternative solution to the current challenges. The aim of this study was to investigate the yield and qualitative performance of a plant genetic collection in water stress condition in order to (1) select and introduce in breeding programs germplasm that exhibits the tolerance to water stress (2) recommend to the farmers genotypes able to perform in water stress conditions.

- ***Methods***

The experiments were conducted at the Vegetable Research and Development Station in Bacau, Romania, in the period of 2011 - 2018. The experiments were conducted at an elevation of 91 m, latitude 46.521946 N, longitude 26.910278 E., average annual temperatures during the experimental period averaged between 8 to 9 degrees Celsius. During the winter, temperatures dropped as low as - 29º C, while during the summer, they reached as high as + 39º C. Average annual rainfall exceed 500 - 550 mm per m2. Daily measurements for temperature and precipitation were registered. The biological material was represented by genotypes of mung bean, tomatoes, peppers, cabbage, onion, basil, melissa. There were accomplished investigations related (1) to yield performance: as number of fruits per plant, number of seeds in fruit, weight of fruits, seeds or herbal, and (2) to quality: as total soluble, total dry matter, proteins, content of pigments, volatile oils.

- ***Results and significance***

In case of all investigated crops, yield depends mainly on soil water status throughout the growing season. There were established critical moments for each investigated species, which requires water supply. Any restriction related to water irrigation supply is likely to induce a decrease in crop yield.

- ***Conclusion***

The impact of deficit irrigation on crop yield was correlated to specific growth stages that are more or less sensitive to moisture deficiency. More investigation that envisage the extension to other crops and cultivars, are needed in order to select appropriate germplasm for suitability in water stress condition.

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Keywords: *vegetables, medicinal, quality, yield*

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Estimated changes due to climate change in horticulture production: A case Küçük Menderes Basin of Ege Region

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Abstract

- ***Introduction***

Over the past 100 years, the global average temperature has increased by approximately 0.6 °C and is projected to continue to rise at a rapid rate. There are also changes in the precipitation regime. Like many countries, Turkey is expected to be severely affected by this situation. Küçük Menderes Basin where located west part of Turkey, is important in terms of horticultural crops production. Today, many temperate fruit species, vegetables (summer and winter) are cultivated commercially, in this region. However, due to the increase in temperature and the decrease in rainfall, it is likely that the species grown will change.

- ***Methods***

In this study, downscaling models based on artificial neural networks were established for monthly average and maximum temperature and monthly total precipitation projections of Seferihisar, Selçuk and Ödemiş meteorological stations in the basin. In the models, NCEP/NCAR re-analysis variables were used as predictors.

- ***Results and significance***

According to the scenarios, monthly mean temperatures may increase up to 3.5ºC. Maximum temperature could increase by 5-6 ºC. Likely the annual total precipitation could decrease by 230-480 mm during until 2100 year. In this case; there is a possibility that changes in the pattern of the horticultural crops that are being cultivated today are compulsory.

- ***Conclusion***

In the some part of basin, while some vegetables may have problems in growing, some will be able to be grown without any problems. It will not be possible to grow some fruit species that are currently production.

Keywords*: Küçük Menderes Basin, Turkey, vegetable, fruit, climate change*

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Temperature and precipitation projections under AR4 scenarios: the case of Kucuk Menderes Basin, Turkey

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Abstract

- ***Introduction***

In the study, it was aimed to prepare temperature and precipitation projections under different climate change scenarios and to present predictions on the possible effects of possible temperature and precipitation changes on the agricultural activities in the Kucuk Menderes Basin.

- ***Methods***

In the study, downscaling models based on artificial neural networks were established for monthly average and maximum temperature and monthly total precipitation projections of Seferihisar, Selcuk and Odemis meteorological stations in the basin. In the models, NCEP/NCAR re-analysis variables were used as predictors. All possible lineer regression relations and performance criteria have been determined from these variables to be used in the downscaling models. The downscaling models calibrated with the optimal predictors convert the coarse resolution results of both reference period (20C3M; 1981-2010) and future period (A2, A1B and B1; 2021-2100) scenarios of ECHAM5 climate model to the station scale temperature and rainfall forecasts. Correction of biases in the forecasts is achieved by using cumulative distribution functions.

- ***Results and significance***

According to the A2, A1B and B1 scenarios, the mean of monthly average temperatures of 2021-2100 period could increase by 3.2, 3.5 and 2.8 ^{o}C respectively and the mean of monthly maximum temperatures of 2021-2100 period could increase by 1.6, 2.1 and 1.1 ^{o}C respectively, the mean of yearly total precipitation could decrease by 31.6%, 42.9% and 30.2%, respectively, when the obtained results were evaluated over study region.

- ***Conclusion***

Under these possible impacts, it is expected that the average net irrigation water demand will increase, soil salinity will increase because the salts that accumulate in the soil during the growing period can't be leaching effectively, some of the crops produced in the basin will not be grown due to the stress conditions, such as increase mean and maximum temperature, decrease water supply and saline soil condition, it has to be changed cropping pattern of the basin. These changes could be more impressive especially eastern part of the basin at the end of the century.

Keywords*: AR4 projections, downscaling, Kucuk Menderes Basin*

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Nitrate pollution of groundwater in some agricultural areas of Romania and its effect on consumers' wellness

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Abstract

- ***Introduction***

To understand the evolution of nitrate pollution of groundwater and establish the measures to limit and control this phenomenon, the following measures were taken: soil survey of the whole community territory; monitoring the land use; monitoring the level of groundwater pollution; establishing the animal loading and manure pressure; proposing measures to limit and control the nitrate pollution.

- ***Methods***

Measurements of groundwater quality were performed using a multi parameter sampling probe. The temperature, pH, and content of salt, dissolved oxygen, NH4, NO3, and chlorophyll have been determined in groundwater samples. Measurements were carried out in five localities placed in different geographic zones of the Country. For two of them the analyses have been repeated so that the evolution of the groundwater characteristics could be assessed.

- ***Results and significance***

Our investigation reveals that the nitrate loading level often exceeds the maximum allowed limits. So, in the study conducted in Văceni Village, Teleorman County, the nitrate content of groundwater exceeded the maximum allowed concentration of 50 mg/kg in 81.82% of 23 analysed wells. In all studied cases, the ammonium nitrogen content exceeded the maximum allowable value of 0.5 mg/l, and in more than 70% the ammonium nitrogen content exceeded 3 mg/l. This makes water unsuitable for human and animal consumption.

- ***Conclusion***

The overall research highlighted that the groundwater pollution with nitrate and ammonium nitrogen has been caused by mismanagement of organic residues.

Keywords*: groundwater, nitrate pollution*

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Variability of the amount of glutathione during in vitro growth conditions at wheat cultivars

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Abstract

- ***Introduction***

Glutathione or γ-glutamylcysteinylglycine is vital for plant metabolism and survival, thus the understanding of reaction mechanisms which regulate their presence is important. Here we report on the concentration of glutathione at roots, stems and leaves of wheat cultivars grown *in vitro* in soil or supplied with water in the absence of biotic or abiotic streeses (excluding the *in vitro* growth mode). Glutathione accumulation, turnover and transport envolve a number of enzymatic pathways many of which not elucidated, however it is well known that at cereals GSH1 and GSH2 genes regulate its biosynthesis in plastids (γ-ECS synthesis) and cytosol. γ-EC is transported from plastids to cytosol, that is why the glutathione content was measured in leaves. It is translocated between subcellular compartments, across plazmalemma and in phloem, thus the concentration in stems was also measured. Since it is already reported that certain cell types, such as root quiescent centre maintain a highly oxidized intracellular state, and ROS (reactive oxygen species) production is expected to increase glutathione presence, the root content was observed as well.

- ***Methods***

Seeds from three local wheat cultivars Dajti, Adelajde and Pobjeda, were germinated in petri dishes supplied with water only, and in soil, until plantlets were developed at growth room in 20-25^{o}C. GSH content was measured following Ellman's test from roots, stems and leaves of two weeks old plantlets.

- ***Results and significance***

Based on the results the thiol content in plants germinated in soil is increased in roots and leaves compared to those supplied with water only, the highest amount is measured in leaves in both cases. The thiol's content in stems is decreased at plants grown in soil for the three cultivars. The total amount of glutathione in plantlets was increased from 1.11-1.17 folds at plants germinated in soil.

- ***Conclusion***

Seed germination in soil has triggered a decrease in the transportation of glutathione through the phloem, which accompanied by the increase of presence in leaves, speak for the increase of expression of γ-EC (in leaves) and peroxidases (GST-related) in roots. Considering the fact that experimental plants were grown in the absence of biotic stresses, and protected from draught, high temperatures, salinity or herbicides, the last considered as the abiotic factors which affect at most wheat culture, these defferences in glutathione content prove how susceptible and complex is the homeostasis of this metabolite at cereals.

Keywords*: Glutathione, γ-ECS, ROS, homeostasis, GST (glutathione S-transferases)*

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Riding the Infinity Wave: Navigating water conflict through the adaptive cycle

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Abstract

- ***Introduction***

Sustainability is not a destination reached, but an emergent property of ever changing systems that are continually negotiating the dynamic balance among multiple competing pressures and payoffs. In human-dominated systems, success is typically measured through wins accumulated during a series of finite games. By contrast, in natural systems evolutionary feedbacks promote strategies where winning is perceived within the context of an infinite game and success is determined by whether you are "still in the game".

- ***Methods***

The first step in operationalizing a resilience model is characterizing the different community responses to disturbance, which are highly dependent on the perceptions of risk (hazard, vulnerability and exposure). These in turn are frequently are not aligned with objective assessment of risk. This problem is made even more complex when one considers the importance of this perception gap within and across the different parts of the risk management cycle and between diverse human cultures.

- ***Results and significance***

This paper will present the analysis of social-ecological water conflicts from four geographically and culturally different communities in Romania, Kenya, Guatemala, and Wisconsin. By using qualitative framework analysis, core factors driving risk perceptions were identified from key actor interviews in each community. These factors were then positioned through a participatory mapping process to produce a consensus dynamic systems map for each conflict. Evolutionary game theory and resilience theory were then used to explore how community perceptions of infinite vs. finite nature of time influenced the tactics used by communities, and how these tactics affect their ability to transform conflict.

- ***Conclusion***

The results demonstrate that the ability for communities to engage in discourse regarding perception of time-horizon for impact assessment is strongly correlated with their ability to manage water resources conflict and navigate the adaptive cycle of system change. The implications of these findings for water resource governance and adaptation to climate change will be discussed.

Keywords*: community resilience, social-ecological systems, conflict transformation, risk perception*

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Sustainable management of soil and water resources from flooding plain by modern technique

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Abstract

- ***Introduction***

The study was focused on the identification possibilities of hydric stress of crop species, by modern techniques, from precinct project areas of flooding plain. In the river plain, especially in lower floodplain, frequently has been found a hydric stress on different crop species due to long drought or periodic water stagnation. We mention that the trafficability and workability of these lands are much reduced in some periods due to waterlogging (for trafficability and workability) or water deficit (for workability).

- ***Methods***

The authors present in detail several useful conclusions resulted after processing of images, obtained by the latest generation techniques.

By using modern devices for taking pictures, from different heights, such as performance drones equipped with digital cameras and with high resolution, are obtained images with whole surface of cultivated crops. Such images cannot be obtained by conventional means at the ground level.

In the context of the recent global climate changes, reflected by the extreme phenomena (prolonged droughts, torrential rains, storms, contradictory water regime), it is of greatly importance to identify the areas with water stress on plants.

- ***Results and significance***

The use of the drones in such situations, in comparison with avio means, has clear benefits as well diminished costs, extensive handling possibilities and the acquisition of detailed images of areas of interest such as so called hot spots, operability and flexibility.

The images accumulated from several locations of flooding plain with different crop species reveal the possibility of identifying in the early stages of negative processes due to the climatic factors that determine the degradation of the soil resources, the growing stagnation of the plants and implicitly the decrease of the quality of the obtained production.

- ***Conclusion***

In the recent precinct project we have identified the gradual increase of the surfaces with micro-relief depression. We believe that the increase of the land unevenness takes place due to the subsidence and compaction processes.

Identifying these processes is important for applying measures to mitigate negative effects on cultivated plants or adjusting pallet cultivation technologies.

Keywords*: hydric stress, monitoring, images drone*

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Vulnerability assessment of community areas to natural disasters based on group fuzzy analytic hierarchy process

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Abstract

- ***Introduction***

The frequency and consequences of natural disasters on functioning of a society requires definition of indicators describing how critical a community area is, as well as the methods for assessing the vulnerability of an area.

- ***Methods***

System approach is applied to analyse the vulnerability of a community area. Five factors and nineteen indicators are proposed and hierarchically organized for assessing vulnerability. Group multi-criteria analysis based on the fuzzy analytic hierarchy process is applied to rank key indicators. Experts assess the values of indicators and their influence on community vulnerability by means of pair-wise comparison of alternatives and group fuzzy analytic hierarchy process. The experts' individual judgements are aggregated at every hierarchical level. The impact of an expert on final decision is based on its previous experience in the field of disaster and risk management. The coefficient of vulnerability (Cv) is defined as the sum of products of corresponding indicator weight (obtained during group fuzzy multi-criteria assessment) and experts' estimation of current indicator value. According to obtained Cv values, five vulnerability levels (I to V) are proposed ("less is better" principle).

- ***Results and significance***

The method is applied to assess vulnerability of two local community areas in South Serbia. Eight experts evaluate vulnerability factors and indicators, with high level of consistency of individual judgments and consistency with other experts' assessments. The experts emphasized disaster characteristics, human and organizational factors as the most important during the assessment. Smaller, rural community area has higher vulnerability due to higher disaster likelihood (floods and droughts), lower coping potential, and less available resources of any kind. Straightforward procedure helps to obtain consistent results from more experts, with reduced subjectivity. The results of ranking are used to identify potential problems in observed area. Identifying vulnerabilities can help communities to improve their potential to cope with adverse events and their consequences.

- ***Conclusion***

Adequate identification of vulnerability causes, described by the set of indicators, improves coping and adaptive capacity, resource allocation and strategies for successful disaster management.

Keywords*: resources, disaster, vulnerability, multi-criteria assessment*

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Study of groundwater quality in urban area of Alba Iulia, Romania

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Abstract

- ***Introduction***

Water is a vital resource and an important factor in the ecological balance. The quality of the well drinking water needs to be tested periodically in order to rule out possible contamination. The drinking water quality in Romania is regulated by Law no. 458/2002 according to the EC Directive 98/83 on the quality of water intended for human consumption. However, active monitorization of such quality testing being conducted by private well owners is difficult to be accomplished. The purpose of our study was to check the quality of various water sources in the Alba Iulia urban area in order to detect specific impurifiers and to document local pollution sources and exposed areas.

- ***Methods***

Over a period of 6 years (2012-2017) we monitored 12 private wells within the Alba Iulia urban area by conducting physico-chemical and microbiological tests on a yearly basis. We monitored the pH values and the content of nitrate, nitrite and ammonium ions, as well as the total viable count of mesophilic bacteria, Escherichia coli, coliform bacteria and intestinal enterococci.

- ***Results and significance***

We found that the microbiological and chemical parameters we determined were outside the legal limits in some of the water sources examined. Variations of these parameters at some particular sources were observed over time

- ***Conclusion***

These results indicate a poor hygienic quality of certain water sources, indicating the need for permanent monitoring in order to identify possible contamination sources.

Keywords*: groundwater, wells, quality, urban area, Alba Iulia*

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Risk assesment of groundwater sources for water supply

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Abstract

- ***Introduction***

Water is an essential element for life and natural processes. Our existence and our economic activities are totally dependent upon this precious resource. It is equally an important climatic factor which supports the development of ecosystems and also the key component in the exchange of substance and energy in the hydrological cycle.

- ***Methods***

Risk identification and contamination of water at critical points should form the basis of risk assessment for public water supplies.

In order to achieve safe water criteria, a water supply requires sanitary protection areas, treatment and a proper monitoring.

- ***Results and significance***

Even if drinking water does not meet all quality parameters in chemical terms, it is desirable to provide further disinfectant water and continue the communication process of risk better than to drink water from unmonitored or untreated sources, even if it is for a short period of time.

Groundwater sources used for drinking water in rural areas are affected by either natural or artificial contamination. In general, groundwater supply source are depreciates in terms of quality and quantity.

- ***Conclusion***

Groundwater sources are the optimal solution in terms of quality, especially for drinking water supply.

Keywords*: groundwater, hydrogeological studies, water supply systems*

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Risks of environmental pollution from mining waste from ore-containing copper processing

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Abstract

- ***Introduction***

Operators of mine waste facilities fulfill their obligations under the Mines Directive. For the determination of the risk for environmental impact, annual monitoring is carried out on key parameters for assessing the compliance of mine waste properties with the results of their basic characterization. The objective is a timely indication of environmental impact assessment.

- ***Methods***

The methods used for risk assessment are static and kinetic leaching tests for pollutants from ore-containing copper processing in Bulgaria.

- ***Results and significance***

As a result, the properties of the waste are identified, through basic characterization and observations are made on the risk of environmental pollution over time.

- ***Conclusion***

In conclusion the changes in waste properties, pollutant mobility and environmental risk are identified.

Keywords*: environmental pollution, mining waste, ore-containing copper processing*

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Impact of climate accros time on water quality of Techirghiol Lake

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Abstract

- ***Introduction***

The main objective of this study was to determine the impact of climate change on physical and chemical properties of the water of Lake Techirghiol, which is unique in Romania due of its hypersaline character and because of the large productivity in the formation of the sapropelic mud with therapeutic properties. The Techirghiol Lake basin hosts a number of natural resources and protected areas that support native plant and animal species which may be sensitive to changing climate conditions.

- ***Methods***

For this purpose, hydrodynamics and salt water quality status, climate, plant species and environmental factors of Lake Techirghiol were investigated. In the context of climate change, evaluation of these data will contribute significantly to protect the quality of lake water, to prevent the water pollution, to conserve and increase the biodiversity in and around the lake

- ***Results and significance***

Techirghiol Lake is a unique natural resource that supports an abundance of aquatic communities whose ecological health is vulnerable to changing climatic conditions. Lake Techirghiol's ecosystems provide economic value to society through therapeutic mud, tourism, recreation, and renewable resources.

This paper has the aim to highlight the influence of climate change on hydrochemical features of Lake Techirghiol, to present the trophic status of this lake, and to show the links between these hydrochemical features and the climatic parameters.

- ***Conclusion***

This paper aims to improve understanding of the potential effects of climate change on Techirghiol Lake. Such an understanding is needed to identify the adaptive actions that human society might need to take to avoid the unwanted consequences of climate change.

Keywords*: fluvio-maritime lake, climate change, hydrochemical parameters*

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Determination of the basic force-displacement on the top in the case of the structure with reinforced concrete frames P+6

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Abstract

- ***Introduction***

The theme of the paper is to design the capacity of a P + 6E construction with reinforced concrete frame structure and determination of the basic force-displacement on the top. Drawing the cutting force - the displacement at the top requires a non-linear bias of the pushover type.

- ***Methods***

The non-linear static calculation is used in the displacement-based design methodology, in which lateral displacements are considered the main parameter for characterizing the seismic response of the structures.

- ***Results and significance***

The objectives are as follows:

- the load given by a strong earthquake seeks to create an appropriate mechanism to release earthquake-induced energy through deformation energy. This mechanism is initiated by the appearance of plastic joints in beams and columns.

- the order of appearance of the plastic joints is followed. The appearance of these plastic joints in columns is not acceptable but at the lower ends of the columns at the base of the structure and at the last level.

- by pushing the structure and the appearance of the plastic joints, the structural strength reserve (redundancy) of the structure is followed, the structure is not avoided and the structure remains at the level of the Life Safety (LS) performance.

- the bilinearization of the capacitance curve determines the able lateral force of the structure (Fy) and the overall ductility of the structure $\mu = \alpha u / \alpha 1$

- ***Conclusion***

It is verified that the seismic deformation requirements in the postelastic domain must be as uniformly distributed and as small as possible, and the capacity to dissipate energy should be as large (requirement<capacity).

Only a few plastic joints exceed the CP (collapse Prevention) limit, but the structure has enough reserves to redistribute the efforts that cannot be taken up by the dissipative elements that have come out of work.

Keywords*: plastic joints, ductility, efforts, postelastic*

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Section C:

GRSWEM: Gis and Remote Sensing in Water and Environment Management
WANDY: Water dAta maNagement anD interoperabilitY
WEE: Water in Engineering Education

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A smart and connected system for water safety, security and situational awareness

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Abstract

- ***Introduction***

Water is fundamental to sustaining life. Drinking water distribution systems are vulnerable to intentional and/or inadvertent contamination. Detection of contaminants is crucial for both general purpose consumption and from security standpoint.

- ***Methods***

Conventional methods employed to sense/detect such contaminants use commercial-off the shelf (COTS) systems and broad-spectrum analytical instruments with interpretive algorithms to detect and characterize toxic contaminants. The current threat environment requires detection of complex contaminant signatures in addition to recycled pharmaceuticals present in water supplies. The advancement of molecular biology and its application in environmental microbiology has represented significant advancement in the ability to rapidly detect waterborne microbial pathogens. Molecular methods coupled with high-throughput parallel process may provide a greater range of microorganism detection. Recent advances in science and technology have brought in new and promising approaches.

- ***Results and significance***

The objective and motivation of this presentation is to provide an overview of a GIS/GPS based Contamination Identification and Level Monitoring Electronic Display Systems (CILM-EDS) prototype to sense/detect and spatially monitor contaminants in real-time with the objectives that appropriate algorithm to detect such contaminants and subsequent remediation strategies are exercised before its entry in residential / commercial / industrial distribution.

- ***Conclusion***

From sustainability standpoint, it is crucial to note that a third of potable water is wasted due to leaks in the water supply. The same system with appropriate sensors can monitor leaks and a smaller version can be utilized along with smart home security monitoring system to monitor and repair leaks to preserve water.

This paper summarizes recent strategies to monitor flow, levels, and contaminants in water distribution system.

Keywords: *Contamination Detection, Water Security, Situational Awareness*

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Determination of water footprint of crop production for different crops by remote sensing technique, a case study of Küçük Menderes basin

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Abstract

- ***Introduction***

Considering the effects of globalization, rapid population growth, urbanization and climate change in recent years, protection and development of freshwater resources, prevention of water pollution and proper sharing of freshwater resources among different sectors has become most important issues.

Only 0.3% of the world's 35 million km^3 of freshwater is made up of freshwater resources suitable for ecosystem and human use. In Turkey, it can be utilized 29% of the total 95 billion m^3 surface water. 78% of this water is used in irrigation, 12% in drinking water and 10% in industry. Turkey is a country that is water scarcity limits. Between years of 1990 and 2010, 40.5% increase in the total amount of water consumed was observed. The amount of water that will be needed in the next 25 years is estimated to be three times higher than today's water consumption.

- ***Methods***

Water footprint is a sign of freshwater use. The water footprint consists of 3 components, green, blue and grey. The water footprint of the production is defined as "the total amount of water required for all products produced in a country". When the water footprint of production according to sectors is examined, domestic water use 7% and industrial production cover 4%, while agriculture water use for the largest share with 89%. While the water footprint of the agriculture is being evaluated, blue and green water footprints are coming into prominence.

- ***Results and significance***

In this research, Küçük Menderes Basin (Turkey), which is important in terms of agricultural production, was chosen as the study area. In particular, agricultural crop patterns between May and October were taken account, in which agricultural production was intensive and blue water was used predominantly.

- ***Conclusion***

In this context, agricultural crop pattern was determined and mapped using satellite images of the study area. As a result of classification of satellite images, water footprint values of crop production for cotton and corn cultivated widely in the basin have been calculated.

Keywords*: water footprint, remote sensing, Küçük Menderes basin*

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Water management based on wireless information technologies and electromagnetic pollution

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Abstract

The aim of this paper is to present the new solution on water management which used wireless technologies and impact to species and wildlife. The paper presents a realized monitoring system with wireless communication and the biological effects of such systems on the living world were analysed in the proximal environment. An analysis of the latest findings from the literature was carried out and the impact indicators and possible directions of further research were presented.

- ***Methods***

The subject of the analysis was the watercourses controlling system with Early warning telemetry solutions. In particular, the communication subsystem was analysed, as well as the characteristics of broadcasting of modern wireless systems and their emission of electromagnetic radiation in the environment. Based on the most common implemented solutions for wireless monitoring of water and other wireless systems in the proximity of the river, an assessment of electromagnetic pollution was done.

Figure F.1 Neke komponente sistema za bezični monitoring voda

- ***Results***

Possible effects on living species (storks, sparrows, etc.) were analysed near the river based on confirmed data. Microwaves may be affecting bird populations in places with high electromagnetic radiation. Prolonged exposure to EMFs, at levels that can be encountered in the environment, may affect immune system function by affecting biological processes.

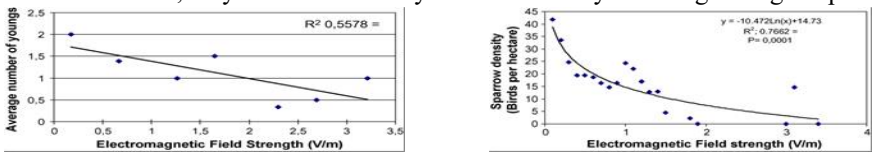

Figure F.2 a) Average number of youngs and electric field intensity of white stork, b) Mean sparrow density as a function of electric field strength grouped in 0.1 V/m.

- ***Conclusion***

According to current state of art in knowledge there is enough evidence of serious effects from this technology to wildlife but there are a lot important biologic effects on animals from electromagnetic pollution. For this reason precautionary measures should be developed, alongside environmental impact assessments prior to installation, and a ban on installation of wireless devices in protected natural areas and in places where endangered species are desirable. Surveys should take place to objectively assess the severity of effects.

Keywords: *water management system1, electromagnetic radiation2, harmful effects3*

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Mike11 as a service for water pollution prediction in rivers

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Abstract

- ***Introduction***

Accidental pollution in rivers can damage the environment and put at risk the health of people and local economies downstream. So, it is mandatory to alert people and, predict the evolution of pollutant concentration.

- ***Methods***

The modelling of hydraulic and advection-dispersion processes in rivers is performed with the aid of Mike 11, a tool for river modelling. It handles different services such as flooding, water quality or forecasting.

In this paper we propose a platform designed to function in real-time, aiming to provide remote execution of Mike 11. The main purpose is to alert people and offer a decision support system. In Figure 1 is presented the architecture of our system. The workflow is the following: first the user access the web interface and fill in the simulation parameters (e.g. start date time of the simulation, end date time, type of the pollutant, the concentration of the pollutant expressed in mg/l, the chain age were the pollution accident took place, and a discharge curve of the pollutant in the river), then the user press run the simulation button. Next, the system sends the XML configuration file to the Mike11 remote server and creates a data storage structure for the new simulation, storing the initial configfile that contains the simulation parameters. After the remote server run the model with initial parameters, extracts the results and sends them to the storage system.

- ***Results and significance***

Finally, the user can visualize the results as a chart in the web interface. The reason we keep simulation data is because we can define a set of "pre-cooked" scenarios. These can be used to offer the approximate results for a given input parameters even when the Mike service is down or cannot be accessed.

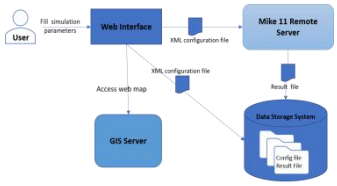

Figure 1 Architecture of the Mike11 service

- ***Conclusion***

In this paper we present a system for water pollution propagation in rivers. This approach is cost efficient, is based on services and use Cloud technologies.

Acknowledgement: Research was supported by UEFISCDI, through the PN III project no. 16/2016, Awarding Participation in H2020 - Data4Water, no. 690900.

Keywords*: mike11, water, pollution, simulation*

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Preliminary flood flow assessment in small catchments for flood hazard and risk mapping in Bosnia and Herzegovina

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Abstract

- ***Introduction***

An initial step in flood hazard and risk mapping is hydrological modelling. We present river flood modelling approach for small ungauged catchments in Bosnia and Herzegovina (BiH) within WBIF, IPF5 project WB12- BIH-ENV-04C1. Preliminary flood risk assessment studies indicated areas of significant potential flood risk that are to be hydraulically modelled. A hydrologic approach is based on hydrometeorological data availability for peak flow estimation at characteristic river sites for hydraulic modelling.

- ***Methods***

Ungauged catchments are identified in relation to river stretches of hydraulic models. Almost 40% of ungauged catchments are small, with drainage area up to 32 km2. In the rainfall-runoff modelling process we apply the design storm approach. To estimate peak discharge in small catchments, we use rational method where we suppose design storm duration equal to time of concentration (Tc) from Horner&Flynth formula. Both the Tc formula and runoff coefficient include catchment physical descriptors, catchment slope being a common one. We apply GIS based estimation of required characteristic from 20m resolution DTM, and Corine Land Cover database (CLC, 2012). By overlaying CLC and slope map we derive from DTM (Fig.1-left), we quantify runoff coefficients.

- ***Results and significance***

For visual inspection of the peak flow modelling results in small ungauged catchments we use peak flow per catchment area (specific runoff) versus catchment area diagrams in two hydrogeologic - karstic belts of the Dinaric Alps. The results indicate a mild drop in specific runoff in both belts for 20 years return period compared to reference runoff at hydrologic stations, and agreement for 100 and 500 years (Fig.1-right).

- ***Conclusion***

GIS based estimation of runoff coefficient improves assessment procedure and decreases uncertainties in peak flows for small ungauged catchments.

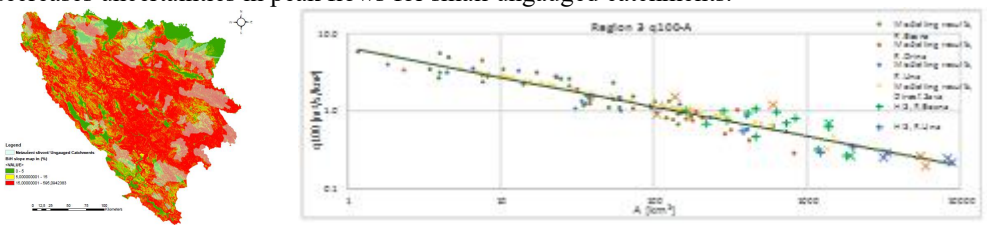

Figure 1. Left – Three categories slope map of BiH. Right – Runoff modelling results.

Keywords: *ungauged catchment, peak flow, slope map, runoff coefficient*

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Natural disasters modeling over a python-based WebGIS platform

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Abstract

- ***Introduction***

The rapid penetration of Geoinformatics technologies into a wide range of Geosciences and Engineering Sciences has created the need to develop software tools that meet specialized processes. Particularly in the field of Geographic Information Systems (GIS), there is a high potential for development of tools for the execution of geo-processes performed both in GIS desktop environment and as geospatial web services in the Web and Cloud GIS environment.

- ***Methods***

The present thesis deals with the development of an online system that aspires to support professionals and researchers in subjects related to Natural Disasters utilizing modern tools and technologies of Geoinformatics.

- ***Results and significance***

In particular, open functions of Geoinformatics tools are used, which are called through a customized web interface, and they are able to calculate specialized indicators related to Natural Disasters, namely floods, landslides and fires.

- ***Conclusion***

In this way, the end-user (client) is not required to have specialized software, nor have mechanisms (libraries or application programming interfaces) installed for the execution of processes except an updated web browser.

Keywords*: Web GIS, natural disasters, Python, Django*

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ASTER DEM for calculating Hydrologic Indices

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Abstract

- ***Introduction***

Access to readily available, as the ASTER, Digital Elevation Models (DEM), provides an alternative to producing them from digitized topographic maps at respective regional scales, in order to indicate flood susceptible areas as part of the flood hazard regional assessment.

- ***Methods***

Morphometric parameters have been widely used as indicators of flood susceptibility and the accuracy of estimating their spatial distribution, defines at large the flood susceptibility assessment of an area. ASTER DEM and topographic maps (topo-maps) of 1/50k scale were used as elevation information in 9 different small catchments with different morphological characteristics.

- ***Results and significance***

Comparison of TWI, SAGA TWI and Stream Power indices produced, showed that index values calculated with ASTER DEM present a close correlation to topo-map based values with very small deviations, up to 7% of the respective index value.

- ***Conclusion***

Moreover, topo-map based DEM perform much better in hilly and mountainous terrains, while ASTER DEM excel in flat areas, providing a much better representation of ground morphology and the respective indices.

Keywords*: ASTER DEM, DEM accuracy, topographic maps vs ASTER, Topographic Wetness Index*

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Local scale data for Drought Indices estimation

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Abstract

- ***Introduction***

Disasters are major catastrophic events which are often aggravated by human intervention, resulting in adverse conditions affecting both natural resources and human habitats. Drought is a 'creeping phenomenon', making its onset and end difficult to determine. Many different indices have been developed over the decades to measure drought in various sectors.

- ***Methods***

This study aims to understand how local scale geographical data used to estimate drought indices, influence drought assessments. Specifically, we investigate the influences of 1:5k scale elevation data and large scale soils and fields data, on agricultural, hydrological and meteorological drought estimation.

- ***Results and significance***

The Digital Elevation Model, who created from this elevation data, is important for surface model creation. In fact, the terrain plays an important role as a distributional factor of many terrain related issues when studying the landscape on spatial level. When deriving natural characteristics dependent on the terrain (air temperature and precipitation surface), accurate DEM is necessary.

- ***Conclusion***

The accurate DEM with the combination of detailed soils data and field land use/cover or crop data (satellite-based precipitation and vegetation data help outline the drought's spatial and temporal properties), give a different view of many drought indicators.

Keywords*: Drought Indices, local scale data, DEM*

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Spatial Management of borehole data using a GIS Cloud Platform

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Abstract

- ***Introduction***

Contemporary Geographical Information Technologies (GIS) over the web can provide the platform for both data acquisition and information sharing. Easy to use tools can nowadays help even novice users, to develop customized spatial databases and GIS applications in order to support collective mapping and information sharing in real time.

- ***Methods***

An attempt to demonstrate the potential of using such a Cloud based GIS environment for collective data input and on the fly processing and information sharing is demonstrated. The respective application (app) was developed using GIS Cloud platform (http://www.giscloud.com/) and the relevant JavaScript Application Programming Interface (API). Such an application can be implemented in a great variety applications including but not limited to environmental and engineering ones. In our demo case, the application developed provides a simple graphical user interface and it uses front-end calculations and Web Processing Services (WPS), for calculating the spatial extend of groundwater protection and management parameters related to pumping.

- ***Results and significance***

Considering the development procedure of this demo application and the respective functionality delivered, it is evident that a GIS Cloud based platforms can provide a fully expandable and customizable environment for developing applications tailored to user needs.

- ***Conclusion***

The use of such a system, brings "ready to use" solutions to even non–expert, in the domain of geoinformatics users, and helps promote collaborative mapping and information sharing in real time, thus maximizing efficiency.

Keywords*: GIS Cloud, spatial management, radius of influence, water resources management, Cloud Computing*

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Inland water fish management (ifM): a decision support system (DSS) for the management of inland water ecosystems

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Abstract

- ***Introduction***

This paper describes the development of a Decision Support System for the Management of Inland Water Ecosystems. The overall aim was to design and develop a decision support system that will assist scientists to make decisions related to the management of inland water ecosystems by providing to the users (environmental services, scientists and researchers) organized literature, descriptive and geographic information of species in inland water ecosystems.

- ***Methods***

The application is an effective tool in the framework of a decision support process for the sustainable environmental management and is aiming to provide the ability to use hypothetical scenarios.

The proposed DSS is named "ifM", i.e. Inland Water Fish Management. The main advantages of the application are: its friendly graphical user interface, practical usability, extensibility and functionality without requiring special knowledge of informatics.

- ***Results and significance***

The benefits of the application include the provision of specialized information to researchers, local authorities and stakeholders and the fact that it can be easily expanded.

- ***Conclusion***

Finally, the achievement of this application is twofold because it promotes scientific research in the field of inland water ecosystems and it is also an excellent tool for the dissemination of environmental information and the enhancement environmental awareness.

Keywords*: decision support system, wetlands management, inland water, fresh water fish fauna*

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Romanian oceanographic data management in the European context

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Abstract

- ***Introduction***

Large amounts of marine data are continuously being collected around the world. Access to marine data and a good management of these data is of vital importance for marine research, for international cooperation and data exchange.

In Romania, NIMRD (National Institute for Marine Research and Development "Grigore Antipa") is the leading marine research institution, as well as national coordinator and focal point with respect to international research tasks and responsibilities in the field of marine science. Being the technical operator of the marine monitoring network (physical, chemical and biological) and for coastal erosion survey, NIMRD hold a comprehensive volume of marine data and information.

- ***Methods***

In 2007, following the IOC/IODE and IOC GOOS objectives and recommendations as well as the poor managing system of national marine data and information, NIMRD established the "Romanian National Oceanographic and Environmental Data Center" (NODEC). The centre is officially recognized by the IOC/IODE (http://www.iode.org) as the national facility for international data and information exchange (http://www.iode.org/nodc).

Its mission is to collect, acquire, process, store and disseminate marine data and metadata hold by Romanian institutes and agencies, as well as to provide graduate level of education in marine sciences.

- ***Results and significance***

Its main objectives are to facilitate the access to marine information, promote development of indicators on marine science and technology, environment and socioeconomics and to encourage cooperation between the National and European Institutions.

- ***Conclusion***

This paper presents the certain national actions underpinned in order to adopt and adapt the best practices developed within the Pan-European Initiatives SeaDataCloud and EMODnet on the use of marine data and metadata standardization, data quality assurance (QA) and data quality control (QC) and data management.

Keywords*: oceanographic data, marine data management, data quality control*

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The use of Moodle e-learning platform for improving students' knowledge in environmental engineering

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Abstract

- ***Introduction***

This paper presents an application of using Moodle e-learning platform to improve the educational process at university level. Particularly, it is about the implementation and use of the e-learning platforms in the framework of the Erasmus+ project entitled Environmental learning innovation for more knowledge and better jobs (EnvYJobs). It is illustrated the implementation and use of e-learning platform in higher education and the experience that was achieved in using such platform in three different universities from Italy (University of Trento), The Netherlands (Saxion University of Applied Sciences) and Romania (University POLITEHNICA of Bucharest).

- ***Methods***

EnvYJobs offers to bachelor, master's degree students and PhD candidates the opportunity to attend six international courses held by four partners involved in this project: The courses include asynchronous web-based lessons and virtual labs supported by an e-learning platform ("web-labs") and live laboratory training ("live labs") held in partners' universities. There, students come into contact with stakeholders including water supply services, civil and environmental protection agencies and industry in order to develop a clear perspective of both parts and try to better adapt the acquired skills to industry requirements.

- ***Results and significance***

The use of Moodle e-learning platform allowed training of 120 students in the field of environmental engineering. At the final of virtual lectures students had the opportunity to attend exams online through the e-learning platform by using the electronic evaluation form. In the framework of the project, after examination, students had the chance to work in a laboratory abroad together with local students in order to develop their technical, communication and team-work skills. Through the achieved results gained across the project implementation, it is shown how the educational process may be improved and students may be motivated once more to attend classes in environmental engineering.

- ***Conclusion***

As technology plays an important role in many fields and aspects, its importance for education cannot be challenged. That is why, the open source Learning Management Systems (LMSs) represent a good option for assisting the teaching activities in different educational fields.

Aknowledgements: This work was supported by the Erasmus+ Programme, EnvYJobs project; contract no 2015-1-RO01-KA203-015089

Keywords*: e-Learning, online education, Moodle platform, environmental engineering*

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Teaching Geodata Management in a multidisciplinary distance learning environment

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Abstract

- ***Introduction***

Geoinformation technologies may perform critical tasks and assist processes belonging to a wide range of geoscientific disciplines and engineering specializations. The applicability and usability of such technologies depends on the needs, the particularities and the constraints of the exact domain of application. Therefore, in educational terms, learning material related to Geoinfomation technologies has to be appropriately adapted to the learners educational profile.

- ***Methods***

In the case of the EnvYJobs ERASMUS+ project, over a hundred postgraduate and undergraduate students from 3 different EU countries and different technical knowledge backgrounds had to be taught a series of electronic courses via a dedicated for this reason virtual learning environment. The course Geoinformation Technologies for Environmental Changes and Pressures Assessment (GEPCA) aimed to introduce to the learners typical actions over geospatial data as well as to familiarize them with current trends worldwide regarding open data and services.

- ***Results and significance***

In specific, three critical actions were demonstrated and relevant experiences were gained by use of free and open source desktop and Web Geographic Information Systems (GIS) software: a) gathering, b) processing and c) publishing of geospatial data.

- ***Conclusion***

In addition, participants were informed about current trends and policies and were encouraged to exclusively work over the Web, to exploit free and open source software, to exploit free geospatial data repositories, to reuse free geospatial web services and to be oriented towards migrating geoprocesess and geoalgorithms in the cloud.

Keywords*: Geoinformation Technologies, Geodata Management, ERASMUS+, envYJobs, Free and Open Source Software*

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Teaching Flood Hazard Assessment to ERASMUS+ students. Lessons learned from the ERASMUS+ "envYJobs" Project

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Abstract

- ***Introduction***

One of the main targets of the ERASMUS+, is the promotion of a "common understanding" in different aspects of both Science and the social life. Bringing together students from different countries is a demanding task since they come from different educational systems, social conditions and usually different educational backgrounds, despite the fact that they may share the same interests.

- ***Methods***

Teaching a subject in such a heterogeneous group of people poses a series of problems which need to be tackled in order to achieve the expected educational targets. The personal interest of each individual student can provide motivation for attending such a programme and ways to trigger it has to be foreseen during the course planning period. Another issue which can be addressed is the adoption of "easy to understand and adopt" teaching practices and this includes the software used for practical training sessions.

- ***Results and significance***

Experiences gained and lessons learned from developing and teaching a course regarding Flood Hazard Assessment (FHA) to the "Environmental Learning Innovation for more Knowledge and better Jobs-envYJobs" (ERASMUS+) students from Romania, Italy and Holland are presented and discussed. FHA course design took into consideration aspects including the heterogeneity of student's scientific background and potential future needs and focused on FHA map interpretation including understanding the uncertainties.

- ***Conclusion***

The adoption of Open Source and Freeware software provided additional support to teaching, since the software tools used by the students can also be used during their professional lives. Asynchronous learning using presentations and video lessons accessed over a dedicated e-learning platform and synchronous learning over webminars and live labs helped to achieve the educational targets.

Keywords*: flood education, ERASMUS+, envYJobs, flood hazard assessment, QGIS tutorials, SAGA GIS tutorials*

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1st International Student Conference Water for Sustenable Development WSD 2018

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Modelling the impact of extreme hydrological phenomena on the environmental service functions

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Abstract

- ***Introduction***

According to the latest Global Risk Report released at the World Economic Forum (WEF), held in early 2018, the experts have agreed that extreme weather conditions are one of the most serious threats facing humanity. The environmental risks have become more visible in the last thirteen years since WEF has published the reports about global risks, as confirmed by the events in 2017, including destructive hurricanes, extreme temperatures and heavy rainfall.

- ***Methods***

This paper presents different impacts of extreme hydrological events on the environmental service functions. The paper is designed as follows: first part is dedicated to the extreme hydrological phenomena explanation and associated risks, while the second part contains methodology in sense of in-depth analysis of their impact modelling based on process functions and multi-attributive ranking, primarily on the basic environmental services.

- ***Results and significance***

In the last 35 years happened over 350 major river floods happened in Europe, out of which as many as 240 in the last fifteen years. Extreme weather conditions in the Republic of Serbia are reflected in events such as heavy rainfall, floods, droughts, heat waves and extreme cold. According to the Republic Hydrometeorological Service of Serbia (RHMS), the heaviest floods in Serbia are recorded in 2002, 2005, 2006, 2009 and the rainiest 2014. When it comes to the drought with a negative impact on water resources and agriculture the most significant years would be: 2000, 2003, 2007, 2011, 2012 and 2013.

- ***Conclusion***

Concluding remarks are formed on the basis of future application of developed and presented model, which is characterized both by scientific and social potential.

Keywords*: extreme hydrological events, risk, environmental services, flood, drought*

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Whether strengthening of policy frames can reflect advanced levels of Sustainable Development (SD)?

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Abstract

- ***Introduction***

Environmental policy integration (EPI) refers to the incorporation of environmental concerns in sectoral policies outside the conventional environmental policy domain, e.g. energy efficiency. Ideally, the performance of EPI strategies is evaluated in terms of physical indicators: environmental quality, CO_2 emissions, reduction of climate risks etc. Since this is difficult, if not impossible, reported levels of EPI usually relate to policy processes and output only e.g. the extent to which environmental concerns are considered in decision-making, and in qualitative terms. Proposed is model built around dimension of integration, e.g. policy frame. Described are different manifestations associated with lower or higher degrees of EPI and whether they influence the decision to invest in renewable energy technologies (RET). Policy frames can be understood as cognitive patterns that structure the reality of political actors. A narrower interpretation is how a particular problem is perceived within a given governance system, i.e. whether a cross-cutting problem is recognized as such and, if so, to what extent it is requiring a holistic governance approach.

- ***Methods***

A questionnaire is designed to test derived research questions. Rating scales is used to measure intensity of opinion. It allows respondents to give a more discriminating response and indicate if they feel neutral. A sample is: venture capitalists, private equity funds, asset managers, investment funds, commercial banks and energy companies.

- ***Results and significance***

The results indicate that the likelihood to invest in RET is, to a certain extent, is influenced by increasing awareness of the cross-cutting nature of the problem, i.e. the problem should not be restricted to a single domain and should not solely be governed by subsystems, but by the governance system as a whole.

- ***Conclusion***

The questionnaire indicates that it is useful to differentiate between those EPI activities which are cross-sectoral, such as the Cardiff Process and the Sustainable Development Strategy (SDS), and those EPI activities which are sector specific, such as the 2006 Green Paper on Energy and the Climate and Renewable Energy Package. It further indicates that, even though cross-sectoral EPI initiatives are potentially important for the integration of climate change into energy policy, they contribution is relatively ambiguous.

Keywords*: Sustainable development (SD), Environmental policy integration (EPI), Renewable energy technologies (RET), policy frame, policy processes.*

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Interdisciplinary study on the influence of the magnetic and electric field on water properties

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Abstract

- ***Introduction***

Interdisciplinary studies realised in recent years have revealed water quality and properties that alter the crystallization structure of many salt ion solutions. These rearrangements are different in the case of the influence of the electric or magnetic field. Also, fluctuations of electric and magnetic field bring changes about the geometry of saline crystals.

- ***Methods***

Researches are complex and the results have presented novelties about the importance of day-night rhythm in modifying the molecular structure and arrangement of electron orbits in water.

Observations made on saline solutions have also been copied in studies on the biological environment. Such studies have been conducted in previous years and have been presented at the BENA conferences.

- ***Results and significance***

The experimental basis has led to the amplification of knowledge on the influence of structured waters in different fields on aromatic and medicinal plant crops. In addition, based on the observations of recent years, studies have been developed that involve both the magnetic field and the electric field separately or together.

- ***Conclusion***

The studies are designed to observe the importance of the two fields' congruence in the germination and further development of plants. This study is interdisciplinary and focuses on a wide range of observations that are designed to help understand the importance of environmental and electrical changes to the development of life.

Keywords*: water, electric and magnetic field, crystallization, germination*

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Advanced mobile technology for wastewater treatment using nanoparticles filters

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Abstract

- ***Introduction***

Waste water contains a number of pollutants, of which some are removed more or less in the conventional cleaning steps and others are retained very little or not at all, in conventional waste water treatment plants.

- ***Methods***

Acute problems of water protection have led to the imposition of severe conditions related to the permitted limit concentrations in the treated effluent discharged into the natural emissaries. Knowledge of the existing pollutants in wastewater, of liquid waste and of effects they have on the environment is particularly important in establishing modalities of advanced epuration in order to comply with quality standards in force.

- ***Results and significance***

This paper presents a modern technology, based on a mobile truck by using some filters for retain nanometric particles, which is used for the first time in Romania for emptying septic tanks and petroleum products separators.

- ***Conclusion***

The performance level of the technology is very high because prevents the contamination of soil, groundwater and surface water through wastewater treatment and of those arising from industrial processes (at national level), especially at regional level (cement, oil industry, food industry, pharmaceutical industry, agriculture, etc.) and the using of treated water with maximum efficiencies.

Keywords*: mobile technology, wastewater treatment, nanoparticles*

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Introducing environmental technologies in industrial fuel combustion processes

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Abstract

- ***Introduction***

Atmosphere pollution is a complex and worldwide process carried out for a long period of time. Greenhouse effect, global warming and acid rain are only some examples giving rise by the atmospheric pollution. Experts discovered a strong motivation in finding solutions on reducing pollutant emissions caused by atmospheric pollution. Transport activities and fossil fuels combustion are the main concern on environmental pollution, more than that they are used in industrial processes, being the main cause on environmental pollution.

- ***Methods***

We have to understand that global pollution is causing a main effect on economic and social challenges of each country, a fact that will be hard to change in the future, and every small step will help for a better and healthy environment. Sebes and Zlanta city, from Alba regions were the areas that drawn our attention on studying the level of atmosphere pollution for a period of 5 years. We made periodic determinations on emission level such as SO2, CO, CO2, NOx and writing down periodic reports. The measurements were made in industrial areas for Zlatna and Sebes city and in urban areas for Alba-Iulia city.

- ***Results and significance***

Traffic environment was the main issue discover after this research. The concerning was on industrial pollution for the cities of Sebes and Zlatna. The final part is offering solutions on reducing gaseous emissions in particular for economic operators and for the industries as well.

- ***Conclusion***

This research is particularly aimed on emissions reduction such as SO2, CO, CO2 and also for volatile organic compounds. Directive 2008/50/CE concerning ambient air quality were the main sources where we started on our research targeting on reducing atmosphere pollution.

Keywords*: industrial polluting emissions, environmental technologies*

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Zooplankton community structure and dynamics in the Romanian Black Sea area in 2017

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Abstract

- ***Introduction***

The zooplankton community plays an important role in all the aquatic ecosystems. This paper presents the dynamics of all the zooplanktonic components (micro, meso and macro) from the Romanian Black Sea area, during the cold and warm seasons of 2017.

- ***Methods***

The samples were collected from the Romanian Black Sea area, during the cold season (March) and warm season (July) of 2017. In order to analyze the microzooplankton component, in particular the loricate ciliate community in 2017, samples were taken from the 0 and 10 m horizons, using Nansen bottles. The mesozooplankton samples were collected using the Juday net, by vertical hauling and from different depths. The macrozooplankton component was collected using the Hansen net by vertical towing. All the samples were analysed in order to determine the densities and biomass for each component.

- ***Results and significance***

The sample analysis revealed, during the cold season, 16 species of tintinidae belonging to the genera Codonella, Codonellopsis, Stenosemella and Tintinnopsis, while during the warm season 8 species belonging to the genera Metacylis, Stenosemella Tintinnopsis and Eutintinnus were identified. Mesozooplankton was represented by the fodder component during the cold season, Copepoda being the bulk of the community, while during the warm season, the nonfodder component (Noctiluca scintillans) recorded the highest values. Macrozooplankton was represented by three species during the cold season: the scyphozoan Aurelia aurita and the ctenophores Pleurobrachia pileus and Mnemiopsis leidyi, Aurelia aurita being best represented. The species mentioned above appeared during the warm season too, the peak being recorded by Pleurobrachia pileus.

- ***Conclusion***

The zooplankton community showed variations during the cold and warm seasons, indicating that environmental conditions play an important role in regulating zooplankton dynamics.

Keywords*: microzooplankton, mesozooplankton, macrozooplankton, Black Sea, community structure*

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Specific diversity of the Romanian Black Sea fish fauna

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Abstract

- ***Introduction***

The diversity of the Romanian Black fish fauna has undergone permanent changes, both qualitatively and quantitatively. These changes have occurred as a result of the deterioration of environmental conditions, but also due to inappropriate fisheries management. Some of these changes have had a major impact on both pelagic and benthic fish populations, affecting common and rare species, juveniles and adults, fish populations of commercial or non-commercial value, thus generating the disappearance of fish populations and, very rarely, the introduction of new species.

- ***Methods***

The diversity of Romanian coast fish fauna was analysed qualitatively and quantitatively from the fish samples collected from pound nets located along the Romanian coastline from Vadu to Vama Veche and the surveys organized using the beach during 2016 - 2017. The marine pound net is a large-scale, trapping fishing gear that is set at depths of 5-12 m. For marine trap nets, the concentration (enclosure) and restraint (catch) rooms of the fishing target are installed parallel to the shore, they can reach the length of 70 m, while the role of direcing the fish is held by the wings made from net, 300-500 m in length, situated perpendicular to the shoreline. The restriction of the surrounded area is achieved by shortening the perimeter, following the recovery of the wings of the gear on the shore.

- ***Results and significance***

In 2011, the number of fish species was estimated at 140, being taxonomically classified in 49 families. Of the 140 fish species identified at the Romanian coast, 88 are of Atlantic-Mediterranean origin, 29 are endemic species in the Black Sea, 13 species are of Mediterranean origin, one of Pontic origin, while cosmopolitan species are new on the Romanian coast. More recently, however, in the Romanian marine area, about 60 species have been reported in the last years from a qualitative point of view, with a large dominance of small species. The quantitative analysis between 2016 and 2017 revealed the following: the dominant species in the samples analysed from pound nets and beach seine were commercial species (sprat, anchovy, shads, horse mackerel etc.), followed in very small quantities (1 to 10 specimens) of non-commercial species.

- ***Conclusion***

Knowing and preserving the specific diversity of the Black Sea is a complex issue of concern. Over the last decades, due to pollution, eutrophication and unrealistic exploitation of bioresources, the total productivity of the marine ecosystem has greatly diminished the Black Sea transforming from a rich and diverse ecosystem into a sea dominated by planktonic species reduced in number, incapable of bearing a rich fauna of large predators.

Keywords*: fish fauna, biodiversity, commercial, bio resources, management*

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Biodiesel production using the biomass of the microalgae *Skeletonema costatum* grown in laboratory cultures

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Abstract

- ***Introduction***

Microalgae are the first link in the food chain, the primary producer of energy inputs into the environment. Depending on their existence, the development and distribution of other trophic levels takes place. Microalgae are not as easy to approach as other organisms which are already being exploited in the biotechnology industry, making this study a step forward for the development of this domain in Romania. This paper aims at using a species of microalgae from the Black Sea as a raw material for biodiesel production.

- ***Methods***

Isolation of the diatom Skeletonema costatum from its natural environment was done by filtering and successive dilutions to remove zooplankton and other microalgae and bacterial species competing for the same nutritional resources (Culcea, 2017). The microalgal biomass was harvested by filtering the culture through Millipore filters (0.45 μm). The collected solution was placed in the drying oven (66℃ for 60 minutes), ensuring optimal drying of the material. The concentration of lipids in culture samples was estimated by adapting the method described by Bligh & Dyer, 1959 to Rekha, 2012. Following the transesterification reaction, the lipids and methanol are transformed in the presence of a catalyst in esters and glycerol (Shalaby, 2011).

- ***Results and significance***

The microalgal biomass was harvested by filtering 1 L of concentrated culture resulting 550 mg of wet biomass. After the drying stage, it was obtained 30 mg of dry biomass. After determining the lipid concentration (from 10 mg of dry biomass) using a mixture of solvents (chloroform: methanol 2:1), it was noticed a yellow-greenish tint after the lipid solution was brought to dryness. Thus, the obtained concentration (34.4%) reflects the lipid content, as well as pigments trained during lipid extraction. Following the reaction between the lipid solution and an alcohol (methanol), in the presence of a catalyst (NaOH), a fine biodiesel film of about 0.1 ml was obtained.

- ***Conclusion***

Skeletonema costatum is a marine diatom with a rapid life cycle (7-10 days). The growth conditions are easy to maintain in the laboratory as well as in special systems such as photobioreactors or artificial ponds. The sea water used for the culture nutritive medium comes from the NIRMD recirculating aquaculture system. All these facts along with the high concentration of lipids demonstrate the potential of this species for biodiesel production.

Keywords: *Biodiesel, Skeletonema costatum, microalgal cultures, Romanian Black Sea waters*

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First macroalgae culture (*Pyropia leucosticta*) from the Romanian Black Sea coast, performed under laboratory-controlled conditions

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Abstract

- ***Introduction***

Macroalgae culture has expanded rapidly in the past years. Porphyra species (also known as Nori algae) are considered the world's most valuable mariculture algal products, due to a high nutritional value and multiple active principles. Pyropia leucosticta is the only Nori representative along the Romanian Black Sea coast, a stenothermal species with no exploitable biomass in natural environment. In view of a potential exploitation of this species, it is necessary to provide algal material in considerable quantities, feasible only through laboratory culture. This paper presents the results of the first macroalgae culture from the Romanian Black Sea coast, performed under laboratory-controlled conditions, through reproductive elements (spores) manipulation.

- ***Methods***

The culture started with the processing of freshly collected algal material from the natural environment (manipulation of the reproductive algal tissue) and the inoculation of spores into sterile Petri dishes (with attached glass microscope slides for spores fixation and Von Stosch Enrichment Solution added to autoclaved sterilized seawater). The newly inoculated Petri dishes were maintained at a temperature of max. 17˚C (a range between 10˚ - 17˚C) with a photoperiod of 12 hours of light and 12 hours of dark. The nutrient media was changed weekly in order to permanently provide the nutrients needed for growth. With the increase in size of newly formed blades (minimum 0.2 cm), they were transferred into 500 ml Erlenmeyer flasks with an attached aeration system and a photoperiod (light:dark) of 12:12, in order to accelerate the growth of the blades (Redmond, S. et al., 2014).

- ***Results and significance***

The paper presents the results of four months of experiment, in order to obtain Pyropia blades into laboratory. After 5 days, spores germination and later the early stage formation of new blades were noticed. After 4 weeks, the blades become easily visible to the naked eye (0.2-0.4 cm) and after 7 weeks, the maximum size of the algae in the culture reaches 1.5 cm. After 4 months, the newly obtained blades reached a maximum of 8 cm. The main problem was the massive development of diatoms, controlled by the addition of a GeO2 solution into the culture medium. The culture was maintained by constantly collecting newly spores released into the Erlenmeyer flasks by the reproductive blades.

- ***Conclusion***

Pyropia leucosticta is suitable for laboratory culture, with a rapid growth regime and can be use as material with applicability in the most diverse domains.

Keywords*: macroalgae culture, Nori, Porphyra, Romanian Black Sea coast*

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Condition index of the mussel *Mytilus galloprovincialis* (Lamarck, 1819) from the Romanian Black Sea coast

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Abstract

- ***Introduction***

The condition index of bivalve molluscs reflects nutritional state and metabolic response at different environmental pressures. The development of bivalves in natural environments is mediated by the interaction between environmental factors. The purpose of this study is to determine the condition index of the marine bivalve *Mytilus galloprovincialis* and to establish the relationship between environmental parameters and its values.

- ***Methods***

This study was carried out from November till December 2017, at four sampling sites. During sampling, in situ physico-chemical properties of seawater (temperature, salinity, pH, dissolved oxygen and total dissolved solids) values were measured using a multiparameter sonde, while water samples were taken for chlorophyll a and total suspended solids analysis. A random number of 30 individuals of the species *Mytilus galloprovincialis* were collected from each sampling site. In the laboratory, the individuals were cleaned of biofouling organisms, measured and then weighted. Following these measurements, condition index was calculated using the method of Davenport and Chen (1987) and Mercado-Silva (2005). Data analysis and statistical analysis were carried out using SPSS Statistics 20 Software.

- ***Results and significance***

The chlorophyll a concentration (Chl a) and total suspended solids (TSS) recorded the highest value at Constanta Harbour (3.66 mg/L for Chl a and 0.60 mg/L for TSS) and the lowest value at 2 Mai station (0.52 mg/L for Chl a and 0.10 mg/L for TSS). The median values of condition index varied between 4.95 g and 9.19 g. There was a significant relationship between condition index and chlorophyll a concentration, total suspended solids, seawater temperature ($p<0.05$).

- ***Conclusion***

The condition index showed the highest values for the mussels collected from the port areas and the lowest values at 2 Mai station. The condition index of the bivalve *Mytilus galloprovincialis* is influenced by the environmental parameters, in particular by the chlorophyll a concentration, total suspended solids and temperature.

Keywords: *condition index, Mytilus galloprovincialis, environmental parameters, Romanian Black Sea coast*

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Coastal erosion in south-eastern of Dobrogea. Case study: 2Mai sector

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Abstract

- ***Introduction***

The purpose of this paper is to determine the effects of coastal erosion in 2 May sector. The littoral of Black Sea is divided in two units: The northern unit is located between Musura Gulf and Midia harbour and the southern unit from Midia to Vama Veche. From geological point of view, the southern unit consists of a limestone base layer over which a layer of loess with a height of 15-20 m was deposited. Sector 2May is located between the breakwater dam Mangalia S and Fisheries. The cliffs are susceptible to erosion and collapse through landslides.

- ***Methods***

Changes in shoreline position are highlighted by remote sensing technique and shore surveying.

- ***Results and significance***

The results obtained show that, compared to the maps of 1960 and 1979, there are major changes in the shoreline of 2 May sector. The rate of erosion is between 0 and 2 m/year.

- ***Conclusion***

Global changes in sea level rise, wind and waves, storms, precipitation and temperature will play an important role in the future evolution of the coast.

Keywords*: coastal erosion, remote sensing, survey, Romanian littoral*

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Flood modeling in Casimcea catchment using GIS technique and 2D hydraulic model

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Abstract

- ***Introduction***

The aim of this paper is to delineate the flood prone area in the Casimcea watershed. Casimcea basin is located in Central Dobrogea Plateau in a temperate continental climate. Casimcea river basin has 740 km² surface and 69 km length. Its annual average discharge is 0,08 m³/s, and has variations between 0,03 m³/s and 0,180 m³/s.

- ***Methods***

Flood prone area is investigated using HEC-HMS, HEC-RAS and GIS. Data elevation model was incorporated in HEC-RAS using GIS technique. The HEC-HMS hydrological model is used in order to produce the flood hydrograph for Casimcea River. Using HEC-RAS 2D hydraulic model the flood limits are calculated for the hydrograph determined by HEC-HMS.

- ***Results and significance***

The analysis of map obtained showed that most of the area is vulnerable to flood.

- ***Conclusion***

The study demonstrates potential HEC–HMS, HEC-RAS application in flood mitigation.

Keywords*: flash flood, flood prone area, Casimcea catchment*

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Remote Sensing, GIS and HEC-RAS techniques, applied for flood extent validation, based on LANDSAT imagery, LIDAR and hydrological data. Case study: Bașeu River, Romania

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Abstract

- ***Introduction***

Floods have always posed great threat to human settlements, and their monitoring has always been a very important step in the understanding, managing and predicting similar, future events, in order to mitigate flood risk and the concrete impact it has on communities and the environment. The aims of this current study are to implement hydrological data, LiDAR elevation data, statistical and GIS software, into one analysis, in order to perform multiple validations of the results' accuracy, for confirming the usability of the method and it's potential errors, by quantitative means. This also implies comparing different indices for choosing the best method of extracting water-land difference rasters.

- ***Methods***

Modern techniques of analysing flood extent include remote sensing, by extracting flood limits from satellite imagery, and GIS, which are used in tandem, to generate cartographic material, depicting areas suffering from flood damage. Unfortunately, the results are not always precise, and can induce significant errors, due to which, the results are questionable and cannot be efficiently included in management plans.

- ***Results and significance***

Results are exclusively quantitative, and depict the overall accuracy situation, regarding both field recordings, statistical data and hydrological modelling, and GIS flood extent areas, as well as the validation of the most accurate vector, derived from water-land separation indices, used in the spatial analysis.(Table 1).

Table 1. Comparison of absolute and accuracy errors, regarding buildings and areas affected, according to the 6 analysed indices, compared to the 5% HEC-RAS refference values

Index	Flooded Area (km^2)	Absolute Error (km^2)	Accuracy Error (%)	Buildings Affected (No.)	Absolute Error (No.)	Accuracy Error (%)
NDWI	30.8	3.3	9.8	265	58	17.9
MNDWI	25.7	8.4	24.7	105	218	67.4
NDVI	24.8	9.2	27.1	136	187	57.8
WRI	24.2	9.9	29.1	92	231	71.5
NDMI	19.7	14.4	42.3	170	153	47.3
AWEI	16.5	17.5	51.4	19	304	94.1

NDWI = (GreenNIR)/(Green+NIR); MNDWI = (Green-MIR)/(Green+MIR);
NDVI = (NIR-Red)/(NIR+Red); WRI = (Green+Red)/(NIR+MIR);
NDMI = (NIR-MIR)/(NIR+MIR) AWEI = 4×(Green-MIR)-(0.25×NIR+2.75×SWIR).
Landsat Imagery specifications: Green = Band 2; Red = Band 3; NIR (near-infrared) = Band 4; MIR (middle-infrared) = Band 5; SWIR (shortwave-infrared) = Band 7.

- ***Conclusion***

The emphasis was put on comparing absolute and relative accuracy values, in order to validate several results, such as digital, HEC-RAS generated water levels with recorded water levels; 5% recurrence interval flood extents of HEC-RAS model, correlated with real-world flood extent, and through satellite imagery.

Keywords*: flood, GIS, HEC-RAS, remote sensing, validation*

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Minarets analysis at the destructive factors action especially in the Dobrogea area

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Abstract

- ***Introduction***

The minarets are an important component of the architecture of the Muslim worship sites and also a very vulnerable structural component.

- ***Methods***

Vulnerability resides in its configuration, its slenderness, composite structure, and vertical mass distribution - very important issues in modeling and calculating it.

- ***Results and significance***

If for new constructions these issues can be quantified more easily, in the analysis of existing structures behaviour, and especially for Muslim worship sites that are part of national patrimony, is needed a special attention.

- ***Conclusion***

This paper aims to make a synthesis of the cases in the Dobrogea area for analysing the minarets response to important seismic actions. This analysis is part of an extensive research program at the Faculty of Civil Engineering of "OVIDIUS" University from Constanta.

Keywords*: destructive factors, minarets, seismic actions*

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Evolution analysis of the design concept to seismic actions for structures in reinforced concrete frames

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Abstract

- ***Introduction***

In the current stage, one of the vital issues is to reduce the risk, to ensure the resistance and stability of the existing buildings - the existing built-up fund.

- ***Methods***

At Romania level, the existing built-up fund is an important component in the major urban centres and the analysis of seismic assurance is directly proportional and equally influenced by how buildings are exploited and by the analysis of the structural concept underlying their design and construction.

- ***Results and significance***

The paper aims to make a synthesis of the antiseismic concept in Romania for structures in reinforced concrete frames identified as being built in different historical stages.

- ***Conclusion***

This analysis represents the synthesis of the first step in quantifying the vulnerability of reinforced concrete structures in Romania.

Keywords*: built-up fund, reinforced concrete structures, antiseismic concept*

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Use of modern technology to develop investment housing projects in Iraq

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Abstract

- ***Introduction***

The problem of housing is one of the most important problems in Iraq, especially with the increase in the rate of population growth which is one of the highest rates in the world and after the great destruction that happened in Iraq because of wars and terrorist acts, and here begins to think about the real solutions of this crisis using modern technology and taking into account the feasibility of using modern construction materials compared to the traditional method of construction.

- ***Methods***

Investors are seriously considering changing the traditional building style and transition to modern building materials to increase quality, win a time, ease of installation and achieve dimensional consistency with ease of internal and external finishing work.

- ***Results and significance***

The hot weather in Iraq requires real attention to the issue of thermal insulation of buildings and therefore can use the advantage of modern materials to increase thermal insulation and reduce in the energy consumption.

- ***Conclusion***

This article sheds light on the investment housing projects in Baghdad city.

Keywords*: investment, thermal insulation, temperature*

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Consequences of the implementation of European directives on environmental factors on irrigation systems

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Abstract

- ***Introduction***

Irrigation systems have the role of bringing and then distributing water on land with vegetation either to help increase farm yields or to maintain landscaping architectural goals or to stabilize poorly cohesive soils to avoid wind erosion.

Irrigations are the main measures to combat the effects of drought on cultivated plants.

- ***Methods***

This paper deals with the rehabilitation of the primary infrastructure of the Babadag irrigation improvement, Tulcea County.

This includes the pumping station SP1 Babadag, the repumping station, SRP1, the hydrotechnical constructions and the ducting and discharge channels.

In order to achieve the obtained results, it was imposed the waterproofing of the channels, the restoration of the hydrotechnical constructions on the route and the replacement of the old equipment with new ones.

- ***Results and significance***

Following the rehabilitation resulted the following: the efficiency of each pumping station was at least 77%, the infiltration on the channels of the induction and discharge had decreased, reaching only 30%, by waterproofing them, the loss being only due to evapotranspiration.

- ***Conclusion***

The need to implement this infrastructure rehabilitation program has proven to be extremely efficient, resulting the increased agricultural productivity and the reduction of electricity consumption by introducing 85% performance equipment.

Keywords*: irrigation, pumping station, repumping station, rehabilitation.*

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