University of Agronomic Sciences
and Veterinary Medicine of Bucharest
Faculty of Land Reclamation
and Environmental Engineering

International Conference

"Agriculture for Life, Life for Agriculture"

BOOK OF ABSTRACTS

Section 5

LAND RECLAMATION, EARTH OBSERVATION & SURVEYING, ENVIRONMENTAL ENGINEERING

2024
Bucharest

University of Agronomic Sciences
and Veterinary Medicine of Bucharest

Faculty of Land Reclamation
and Environmental Engineering

International Conference
"Agriculture for Life, Life for Agriculture"

Book of Abstracts

Section 5

Land Reclamation,
Earth Observation & Surveying,
Environmental Engineering

2024
Bucharest

PUBLISHERS:

University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania - Faculty of Land Reclamation and Environmental Engineering
Address: 59 Marasti Blvd., District l, Zip code 011464, Bucharest, Romania
Phone: + 40 213 1830 75, E-mail: conference@fifim.ro, Webpage: www.fifim.ro

CERES Publishing House
Address: 29 Oastei Street, District 1, Bucharest, Romania
Phone: + 40 21 317 90 23, E-mail: edituraceres@yahoo.com, Webpage: www.editura-ceres.ro

To be cited: BOOK OF ABSTRACTS - Section 5: LAND RECLAMATION, EARTH OBSERVATION & SURVEYING, ENVIRONMENTAL ENGINEERING, 2024

ISSN 2457-3248
ISSN-L 2457-3248

SCIENTIFIC COMMITTEE
OF LAND RECLAMATION, EARTH OBSERVATION & SURVEYING, ENVIRONMENTAL ENGINEERING SECTION

- Alexandru BADEA - University of Agronomic Sciences and Veterinary Medicine of Bucharest/Romanian Space Agency, Romania
- Ioan BICA - Technical University of Civil Engineering of Bucharest, Romania
- Daniel BUCUR - Iasi University of Life Sciences (IULS), Romania
- Stefano CASADEI - University of Perugia, Italy
- Fulvio CELICO - University of Molise, Italy
- Carmen CIMPEANU - University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
- Sorin Mihai CIMPEANU - University of Agronomic Sciences and Veterinary Medicine of •Bucharest, Romania
- Maria Jose ORUNA CONCHA - University of Reading, United Kingdom
- Marcel DARJA - University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania
- Andrea DOMINIJANNI - Politecnico di Torino, Dipartimento di Ingegneria Strutturale, Edile e Geotecnica (DISEG), Torino, Italy
- Claudiu DRAGOMIR - University of Agronomic Sciences and Veterinary Medicine of Bucharest/National Institute for Research and Development - URBAN-INCERC, Bucharest, Romania
- Eric DUCLOS-GENDREU - Spot Image, GEO-Information Services, France
- Radu Claudiu FIERASCU - National Institute for Research & Development in Chemistry and Petrochemistry - ICECHIM Bucharest/National University of Science and Technology POLITEHNICA Bucharest, Romania
- Jean-Luc HORNICK - Université de Liège, Belgium
- Catalina ITICESCU - "Dunarea de Jos" University of Galati, Romania
- Bela KOVACS - University of Debrecen, Hungary
- Hossein KAZEMi - Gorgan University of Agricultural Sciences and Natural Resources (GUASNR), Gorgan, Iran
- Raluca MANEA - University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
- Alina ORTAN - University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
- Jovan Br. PAPIC - University "Ss. Cyril and Methodius", Faculty of Civil Engineering, Skopje, Republic of North Macedonia

- Nelson PÉREZ-GUERRA - University of Vigo, Spain
- Nicolae PETRESCU - Valahia University Targoviste, Romania
- Dorin Dumitru PRUNARIU - Romanian Space Agency, Romania
- Andrei Victor SANDU - "Gheorghe Asachi" Technical University of Iasi, Romania
- Umut Gunes SEFERCIK - Gebze Technical University, Turkey
- Ando SHIN - Tokyo University of Science, Japan
- Jesus SIMAL-GANDARA - University of Vigo, Spain
- Marisanna SPERONI - Centro di Ricerca Zootecnia e Acquacoltura, Consiglio per la Ricerca in Agricoltura e L'analisi Dell'economia Agraria (CREA), Italy
- Razvan TEODORESCU - University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
- Augustina Sandina TRONAC - University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
- Ana VIRSTA - University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
- Neven VOĆA - University of Zagreb, Croatia

ORGANIZING COMMITTEE

- Ana VIRSTA
- Mirela Alina SANDU
- Augustina TRONAC
- Veronica IVANESCU
- Mihaela DRAGOI
- Andreea OLTEANU
- Tatiana OLINIC
- Constanta MIHAI
- Florin NEACSU

CONTENTS

ENVIRONMENTAL SCIENCE AND ENGINEERING

SUSTAINABLE DEVELOPMENT OF RURAL AREA

DISASTER MANAGEMENT

WATER RESOURCES MANAGEMENT

POLLUTION CONTROL, LAND PLANNING

EARTH OBSERVATION AND GEOGRAPHIC INFORMATION SYSTEMS & TOPOGRAPHY AND CADASTRE

MISCELLANEOUS

ENVIRONMENTAL SCIENCE AND ENGINEERING

EVALUATION OF CHEMICAL COMPOSITION OF ESSENTIAL OIL AND TOXIC METAL ACCUMULATION OF LEMONGRASS (*CYMBOPOGON FLEXUOSUS* STAPF.) CULTIVATED ON METAL-CONTAMINATED SOILS

Violina ANGELOVA

Agricultural University-Plovdiv, 12 Mendeleev Blvd, Plovdiv, Bulgaria

Corresponding author email: vileriz@abv.bg

Abstract

The present study determines the chemical composition of lemongrass oil, content of heavy metals and identifies the possibility of lemongrass growth on soils contaminated by heavy metals. The experimental plots were situated 0.5 km from the source of pollution, the Non-Ferrous-Metal Works (MFMW) near Plovdiv, Bulgaria. The accumulation of various heavy metals in above and below-ground plant parts of lemongrass was determined by ICP. The essential oils of the lemongrass were obtained by steam distillation in laboratory conditions, and chemical composition was determined. Lemongrass is a plant tolerant to heavy metals and can be grown on contaminated soils. Based on translocation and bioconcentration factors, lemongrass can be used for phytostabilization. Heavy metals do not affect the development of lemongrass and the quality and quantity of oil obtained from it. The essential oil of lemongrass can be a valuable product for the farmers from the polluted regions.

Key words*: contaminated soils, essential oil, heavy metals, lemongrass.*

DETECTION AND MONITORING OF HYDROCARBON POLLUTION SOURCES IN THE PETROMIDIA REFINERY AREA

Sorin ANGHEL

National Institute for Research and Development on Marine Geology and Geoecology -GeoEcoMar, 23-25 Dimitrie Onciul, Bucharest, Romania

Corresponding author email: soanghel@geoecomar.ro

Abstract

The detection and spatiotemporal monitoring of hydrocarbon contamination in the geological environment (soil, geological formations, and groundwater) represent the main objective of the study, conducted during the period of 2023-2024. The study focused on areas adjacent to the Petromidia refinery with industrial activity exceeding five decades, located in the vicinity of the city of Navodari. Both `classic` geophysical techniques (VES - Vertical Electrical Sounding, IP - Induced Polarization) and recently introduced techniques on a global scale (GPR - Ground Penetrating Radar) were employed. Electrical and electromagnetic measurements were complemented by magnetic investigations, drilling works, and geological and hydrogeological observations. The most effective geophysical measurements, both for detecting and monitoring underground hydrocarbon contamination, were the geoelectrical resistivity ones, due to the significant contrast in electrical resistivity between the highly resistive pollutant substances and the affected geological environment, consisting of rocks and fluids with much higher electrical conductivity. The geological and hydrogeological data from shallow boreholes were used for the correct interpretation of geophysical anomalies, while the results of magnetic measurements indicated the routes of buried pipelines, and potential sources of pollution.

Key words*: electrometry, hydrocarbon, pollution, soil.*

RESEARCH ON THE USE OF SLUDGE FROM THE PITEȘTI WASTEWATER TREATMENT PLANT AS FERTILIZER

Gabriela BIALI[1], Esmeralda CHIORESCU[2], Maria Cătălina PASTIA[1], Denis ȚOPA[2], Iuliana MOTRESCU[2, 3], Irina Gabriela CARA[3]

[1]"Gheorghe Asachi" Technical University of Iasi,
Faculty of Hydrotechnics, Geodesy and Environmental Engineering,
65 Prof. Dimitrie Mangeron Blvd, Iasi, Romania
[2]"Ion Ionescu de la Brad" Iasi University of Life Sciences,
Faculty of Agriculture, 3 Mihail Sadoveanu Alley, Iasi, Romania
[3]Research Institute for Agriculture and Environment,
14 Mihail Sadoveanu Alley, Iasi, Romania

Corresponding author emails: esmeralda_chiorescu@yahoo.com,
gbiali@yahoo.com

Abstract

Sludge is a by-product, resulting from wastewater treatment. This study research provides for the sludge analysis from the Pitești Wastewater Treatment Plant and the possibility of using this sludge in agriculture in its initial state, resulting from the treatment plant or even after any remediation required or appropriate treatment so that it can be used.
For these analyses, we used the services of two laboratories, namely: Iași Research Institute for Agriculture and Environment – ICAM, from the "Ion Ionescu de la Brad" Iași University of Life Sciences and WESSLING – testing and consulting laboratory for continuous improvement of quality, safety, environmental protection, and health – the Hungarian laboratory.
The research focused on the presence of heavy metals, antibiotics, and hormones in the sludge and the determination of microplastics in it. The microplastics in the sludge were determined by treating them with 5% HCl sonicated at 25°C and then centrifuging and analyzing the supernatant. The research results show that the sludge obtained from the Pitești Wastewater Treatment Plant cannot be used as fertilizer in agriculture.

Key words*: sludge, wastewater treatment.*

OBTAINING ALKALI ACTIVATED INORGANIC MATERIALS BY RECOVERY OF WASTES

Mihaela CAFTANACHI[1, 2], Ramona-Elena TATARU FARMUS[1], Maria HARJA[1]

[1]"Gheorghe Asachi" Technical University of Iasi, Faculty of Chemical Engineering and Environmental Protection, 73 Mangeron Blvd, Iasi, Romania
[2]S.C. Gemite RO SRL, 52 S.F. Petru Movila Street, Iasi, Romania

Corresponding author email: maria_harja06@yahoo.com

Abstract

Currently, the large amount of waste produced is a significant problem for the environment and for the people who live near the deposits of by-products obtained from technological processes. Limited storage capacity, as well as the uncontrolled disposal of waste or industrial by-products from landfills, are growing concerns for environmental protection. The recovery of waste can be carried out in order to obtain new inorganic materials, known under several names, including geopolymers, alkaline activated materials. Aluminosilicate sources can come from industrial by-products such as silica fume, slag, fly ash, etc. In the formulation of this material, the type, ratios and concentrations of the compounds in the mixture are very important to the properties of the new inorganic materials. Prior to synthesis, a compressive analysis of the source materials must be performed to identify the minerals present and their amount relative to the total mass. The aim of this study is the formulation and characterization of new alkaline activated materials with the replacement of cement, and establishing the influence of the properties of raw materials over final products.

Key words*: aluminosilicate sources, inorganic materials, recovery, waste.*

TESTING THE INFLUENCE OF EROSION ON SOIL CHEMICAL INDICATORS

Cosmina CANDREA, Marcel DÎRJA, Vasile DODEA

University of Agricultural Sciences and Veterinary Medicine
of Cluj-Napoca, Faculty of Silviculture and Cadastre,
3-5 Calea Manastur Street, Cluj-Napoca, Romania

Corresponding author email: marcel.dirja@usamvcluj.ro

Abstract

Soil erosion is one of the most widespread forms of soil degradation. The research was conducted with the aim of identifying the influence of erosion on chemical traits of moderately sloppy degraded luvisoil, using appropriate indicators. The experiment is located in Borod commune, Bihor County. To carry out the study of the level of soil erosion, a bifactorial experiment was organized, with the factors represented by the type of crop (meadow and corn) and the location of the crop (on contour lines and in the hill-valley direction). The biological material consists of alfalfa-dominated grasslands and maize maintained on typical, moderately eroded Luvisol. It is found that for the exploitation of the meadow, the highest values of the nutrient content are recorded, compared to the corn crop. The chemical indicators of soil quality are strongly influenced by the location of the crop, the location of the crop at the base of the slope having the strongest influence, but in the case of pH and mobile phosphorus content, located at the top of the slope.

Key words*: differences, dry matter, fertilizer, irrigation, water.*

COMPOSITE MATERIALS FOR ECO-SUSTAINABLE CONSTRUCTIONS

Adrian Alexandru CIOBANU[1], Aurelia BRADU[1], Andreea HEGYI[2]

[1]National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development - URBAN-INCERC, Iasi Branch, 37 Prof. Anton Sesan Street, Iasi, Romania
[2]National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development - URBAN-INCERC, Cluj-Napoca Branch, 117 Calea Floresti, Cluj-Napoca, Romania

Corresponding author email: bradu_aurelia@yahoo.com

Abstract

This work aims to research and promote construction products based on natural raw materials. The study and promotion of traditional materials can represent an answer to the problem of carbon emissions. More and more specialized studies prove the fact that new, modern constructions can alter both our lifestyle, compromising our physical, mental and emotional health. The conclusions of the studies do nothing but reinforce the idea of the fact that returning to traditional materials, their re-assimilation in current constructive techniques and solutions, represents the right solution both for the environment and for us as individuals. Research involves development and experimental research to check the characteristics and performance of products made from natural raw materials (clay, lime, straw, hemp, wood waste in the form of sawdust) and various additions and/or additives in the lowest possible percentages, by studying some recipes different compositions, in order to optimize them from both a mechanical and hydrothermal point of view, depending on the areas of intended use.

Key words*: adobe bricks, clay, sustainable development, traditional composites materials.*

ECOLOGICAL RESTORATION OF NORWAY SPRUCE STANDS AFFECTED BY DRYING FROM OUTSIDE THE NATURAL RANGE

Cristinel CONSTANDACHE[1], Ciprian TUDOR[1, 2], Valentina AGA[1, 2], Laurenţiu POPOVICI[1]

[1]Marin Drăcea National Institute for Research and Development in Forestry, 128 Eroilor Blvd, Voluntari, Ilfov, Romania
[2]Transilvania University of Braşov, Interdisciplinary Doctoral School, 29 Eroilor Blvd, Braşov, Romania

Corresponding author email: cipriantudor95@yahoo.com

Abstract

The forest plantations (Norway spruce, pine) installed outside the habitat are fragile, vulnerable ecosystems, exposed to some risk factors, registering significant damages. In the paper, the analysis of the environmental conditions of some lands with Norway spruce stands outside the habitat, affected by intense drying, and the substantiation of their ecological restoration solutions are presented. The results were obtained based on research carried out in 2023 in the area of the Suceava Plateau (Marginea Forest District). The physicochemical characteristics of the soils were strongly altered, having a low content of nutrients and minerals, with a contrasting texture, being poor in bases and heavy drainage, strong acidity, and affected by pseudo-glazing processes. The ecological restoration of Norway spruce stands affected by drying consists of replacing them with species corresponding to the environmental conditions, but only after carrying out special land and soil preparation works to improve its physical and chemical properties. The results obtained are particularly important considering the need for ecological restoration of large areas with Norway spruce stands outside the habitat, strongly affected by drying.

Key words*: ecological restoration, environmental conditions, Norway spruce, drying; natural range.*

USING EXPIRED DRUGS AS ENVIRONMENTALLY FRIENDLY CORROSION INHIBITORS

Claudia CRISAN, Horatiu VERMESAN

Technical University of Cluj-Napoca, 28 Memorandumului Street, Cluj-Napoca, Romania

Corresponding author email: claudia.crisan@imadd.utcluj.ro

Abstract

Hazardous waste management is one of the problems our society is facing today. Expired drugs are a type of waste that is not reused in any way, but rather incinerated to be disposed of. These drugs have been proven to be good corrosion inhibitors for different metals and in different corrosive solutions. They are a good alternative to the synthetic inhibitors the industry uses today, due to their environmental friendliness, good corrosion inhibitor rates and economic advantages. The present research uses expired drugs as corrosion inhibitors for mild steel in concentrated sulfuric acid solution and characterize their inhibitive performance through weight loss measurements, EIS spectra, and cyclic voltammetry. The drug proved to be effective environmentally friendly corrosion inhibitor for mild steel, being a possible way of recycling expired drugs.

Key words*: expired drugs, hazardous waste, green corrosion inhibitor, industrial pickling.*

AN INTEGRATIVE APPROACH FOR THE DEVELOPMENT OF ENVIRONMENTAL STRATEGY IN THE CLIMATE CHANGE CONTEXT. THE PERSPECTIVE OF LOCAL PUBLIC AUTHORITIES' ACTION

Anca DRAGHICI[1], Iudit BERE-SEMEREDI[2], Gabriela BANADUC[1], Cornelia BAERA[1]

[1]Politehnica University of Timisoara, 2 Victoriei Square, Timisoara, Romania
[2]Timis County Council, 17 Revoluției din 1989 Avenue, Timisoara, Romania

Corresponding author email: anca.draghici@upt.ro

Abstract

The present research aims at the identification, characterization, and procedural substantiation of the model for the environmental strategy development (feasible, efficient and effective) to achieve the objective of a sustainable (green) local community, by considering the phenomenon of climate change. Three quantitative studies preceded the qualitative research for the development of the conceptual model: (1) Research on citizens' perception, knowledge, attitudes and behaviour towards climate change with Timisoara citizens; (2) Research on exploring the training needs of public servants (from Timis county) in the knowledge field of climate change and sustainable energy consumption; (3) Research on nature-based solutions and green infrastructure for climate change mitigation and adaptation. We have extended the legal framework of the qualitative study with an inventory of contextual and phenomenological premises given by the European Covenant of Mayors for Energy and Climate and details of the Green European Capitals. The ultimate objective of the presented holistic approach to developing the environmental strategy is a resilient urban community (capable of adapting to change while continuing to function normally and continuously develop itself satisfying citizen needs).

Key words*: climate change, conceptual model, environment strategy public authorities, sustainable local community, Qualitative research.*

ENVIRONMENTAL ASSESSMENT OF THE AREA WITH NATURAL CO_2 EMISSIONS IN BĂILE LĂZĂREȘTI

Alexandra-Constanța DUDU, Ana Bianca PAVEL, Corina AVRAM, Irina CATIANIS, Gabriel IORDACHE, Florina RĂDULESCU, Naliana LUPAȘCU, Andrei-Gabriel DRAGOȘ, Oana DOBRE, Constantin-Ștefan SAVA

National Institute for Research and Development on Marine Geology and Geoecology - GeoEcoMar, 23-25 Dimitrie Onciul, Bucharest, Romania

Corresponding author email: alexandra.dudu@geoecomar.ro

Abstract

Băile Lăzărești, located 16 km north-east from Băile Tușnad, is a representative area for post-volcanic regions where gases emitted at the surface contain over 85% carbon dioxide. Nineteen stations were set up for collecting soil samples for analysis of heavy metals, TOC, carbonates, and lithology and four water stations for nutrient analysis in July and August 2022. The impact of increased CO_2 emissions on the soil is evident through the exceeding normal concentrations of heavy metals such as Cr, Cu, Hg, and Ni in areas with high CO_2 emissions and their reduction in areas with lower volcanic gas emissions. Water sample analysis, all with high CO_2 concentrations, showed elevated levels of nitrites, inorganic phosphorus, and sulphates, classifying the water quality into categories II and III, according to national classification. The impact of high CO_2 concentrations is clearly visible in the vegetation, which is absent at CO_2 concentrations above 20%, predominantly consists of grasses, and shows distinct colorations at concentrations below 20%. These observed and analysed elements could serve as surface indicators for potential CO_2 leaks from anthropogenic storage sites.

***Key words**: Băile Lăzărești, Băile Tușnad, carbon dioxide emissions, CO_2 impact, soil sampling, water sampling.*

THE INFLUENCE OF TEMPERATURE ON SOUND WAVES

Bogdan ERGHELEGIU, Mirela Alina SANDU, Daniela IORDAN

University of Agronomic Sciences and Veterinary Medicine of Bucharest,
Faculty of Land Reclamation and Environmental Engineering,
59 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: mirela.sandu@fifim.ro

Abstract

Sound waves are mechanical waves in the longitudinal direction that propagate in a variety of solid or gaseous media. The medium for the propagation of sound waves is the atmospheric environment. This medium consists of particles which are influenced by environmental conditions. The purpose of this paper is to show that atmospheric temperature can have an effect on the speed of propagation of sound waves. The measurements on which the study is based were made in the same areas and at the same time intervals, under the same atmospheric conditions, during periods of high and low temperature. The results confirm that the speed of sound waves is influenced by the parameters of the environment in which they propagate. The speed of sound is faster when temperatures are higher.

Key words*: environment, propagation, sound waves, temperature.*

STUDIES REGARDING THE USE OF POURED EARTH IN BUILDINGS

Aurelian GRUIN[1, 2], Cornelia BAERĂ[1, 2], Sorin DAN[2], Bogdan BOLBOREA[1, 2], Ana Cristina VASILE[1]

[1]National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development - URBAN-INCERC, 266 Pantelimon Road, District 2, Bucharest, Romania
[2]Politehnica University Timisoara, 2 Victoriei Square, Timisoara, Romania

Corresponding author email: aurelian.gruin@gmail.com

Abstract

This study explores poured earth construction as an environmentally friendly alternative to conventional cement-based materials. Soil materials, mirroring natural concrete with grains bonded by clay particles, presents environmental benefits, including recyclability, low environmental impact, and effective hygrothermal regulation. The decline in traditional earth construction is associated with industrialization, prioritizing efficiency over traditional methods The technique involves pouring a mixture of local earth, sand, gravels, and a modest quantity of either Portland cement or additives as alternatives into formworks to fabricate load-bearing and non-loadbearing elements. Despite its potential as a sustainable option, challenges such as shrinkage control and durability persist. Poured earth construction can be a substitute for cement-based materials. Ongoing research and practical applications illustrate feasibility, but further advancements are necessary to enhance productivity and mitigate environmental impact, with additives for stabilization emerging as a prospective way for future development.

Key words*: clay, formwork, load bearing, poured earth.*

COMPARISON OF METHODS FOR ANTIBIOTIC COMPOUNDS REMOVAL FROM AQUEOUS SOLUTIONS

Diana HANGANU [1], Lidia FAVIER[2], Maria HARJA[1]

[1]"Gheorghe Asachi" Technical University of Iasi,
Faculty of Chemical Engineering and Environmental Protection,
73 Prof. D. Mangeron Blvd, Iasi, Romania
[2]University of Rennes, Ecole Nationale Supérieure de Chimie de Rennes,
11 Allée de Beaulieu, 7 Rennes Cedex, France

Corresponding author email: maria_harja06@yahoo.com

Abstract

This article presents an in-depth exploration of diverse methodologies for the separation and removal of various classes of antibiotics from water and aqueous solutions. Focusing on recent advancements, the study offers a comprehensive overview of active substances and novel combinations employed in the removal processes. Notably, the role of adsorbents is discussed, emphasizing their high porosity that enables efficient absorption of substantial contaminant doses. Additionally, the financial benefits of employing photocatalysts in contaminant degradation are highlighted, with an emphasis on the growing body of research in this area. The historical significance of exchange resin as one of the pioneering removal methods is acknowledged, alongside a more contemporary examination of electrochemical approaches specifically tailored to the structural and ionic characteristics of antibiotics. Serving as a valuable guide, this article addresses the advantages and considerations associated with diverse methods of separating antibiotics from aqueous solutions, providing insights into emerging technologies and facilitating informed decision-making in environmental remediation efforts.

Key words*: antibiotics, adsorption, exchange resin, photocatalysis.*

ANALYSIS OF GHG EMISSIONS BY SECTORS IN CITY OF VIDIN

Daniela KOSTOVA-IVANOVA

University of Food Technologies, 26 Maritza Blvd, Plovdiv, Bulgaria

Corresponding author email: daniela_kostova07@abv.bg

Abstract

The publication presents an analysis of the baseline inventory of greenhouse gas emissions by sector in city of Vidin, based on the assessment of final energy use in the sectors, according to the methodology for developing a Sustainable Energy and Climate Action Plan (SECAP) in the framework of the Covenant of Mayors. The GHG emissions inventory enables local governments to understand the emissions contribution of different activities; to determine where to direct mitigation efforts and to create strategies to reduce GHG emissions and track their progress.

The article presents the results of the analysis of the base inventory of emissions in the city of Vidin, including the description of the methodology and key factors affecting emissions in the sectors "Residential buildings", "Public and Tertiary buildings", "Transport", "Public lighting" and "Industry", considering possible strategies and measures to reduce carbon footprints, including the amount of emissions gases. This analysis aims to provide a basis for developing sustainable policies in the municipality aimed at achieving the goal of reducing greenhouse gas emissions by 40% by 2030 by identifying and planning climate change mitigation and adaptation actions.

Key words*: baseline GHG inventory, climate change adaptation and mitigation actions, energy use by sector, GHG emissions, Sustainable Energy and Climate Action Plan.*

SMART-ECO-INNOVATIVE COMPOSITE MATERIALS WITH SELF-CLEANING CAPABILITY AND ENHANCED RESISTANCE TO MICROORGANISMS

Adrian-Victor LAZARESCU, Andreea HEGYI, Carmen FLOREAN

National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development - URBAN-INCERC, Cluj-Napoca Branch, 117 Calea Floresti, Cluj-Napoca, Romania

Corresponding author email: andreea.hegyi@incerc-cluj.ro

Abstract

This research focuses on the development of advanced cementitious composite or geopolymer materials that exhibit smart, eco-innovative properties, including self-cleaning capabilities and heightened resistance to microorganisms. The aim is to address environmental concerns and enhance the durability and functionality of materials in various applications. The composite materials are designed by incorporating novel nanomaterials and eco-friendly additives, leveraging their unique properties. The self-cleaning capability is achieved through the integration of photocatalytic nanoparticles, such as titanium dioxide, which harness solar or artificial light to catalyse the degradation of organic contaminants on the material`s surface. The eco-innovative aspect of the research involves the utilization of sustainable components, minimizing the environmental impact of the composite materials throughout their life cycle. The materials are designed to correspond to the Circular Economy and Sustainable Development principles by reducing overall waste generation and the study involves a comprehensive characterization of the mechanisms that allow the production of these type of materials.

Key words*: advanced composites, microorganism resistance, photocatalysis, TiO_2 nanoparticles.*

ADVANCED RECOVERY OF VALUABLE MATERIALS FROM E-WASTE

Ștefan-Leontin MARTINAȘ-IONIȚĂ, Gabriela Antoaneta APOSTOLESCU, Maria HARJA

"Gheorghe Asachi" Technical University of Iasi,
Faculty of Chemical Engineering and Environmental Protection,
73 Prof. D. Mangeron Blvd, Iasi, Romania

Corresponding author email: mharja@tuiasi.ro

Abstract

Due to rising customer demand, the manufacturing of electrical and electronic equipment has expanded dramatically in recent years; nevertheless, because technology is advancing so quickly, the equipment's lifespan has decreased. Consequently, an enormous volume of electronic waste (also known as "e-waste") is produced each day.
The majority of these wastes consist of materials that, in the wrong hands, can have an adverse effect on the habitats they are placed in and, indirectly, the species that live there. Metals, polymers, and refractory oxides are frequently found in these wastes. These materials can be highly valuable economically if they are correctly collected and separated. The main strategies for isolating and recovering valuable components from electrical and electronic waste were examined in this study, along with how successful these approaches were at disposing of waste.

Key words*: electronic, metals, pollution, recycle, waste.*

CARBON FOOTPRINT - IMPORTANT DRIVER OF CLIMATE CHANGE GENERATED BY THE FOOD INDUSTRY

Adelina MOJA, Vasile PADUREANU, Mirabela LUPU, Alina MAIER, Cristina CANJA

Transylvania University, 148 Castelului Street, Brasov, Romania

Corresponding author email: canja.c@unitbv.ro

Abstract

In the context in which one of the biggest problems affecting the environment worldwide is that of global warming, the study of carbon footprint, greenhouse gases and their effects is of utmost topicality. Current statistics show that agriculture and the food industry are some of the sectors with a significant carbon footprint, resulting in the need for conclusive studies to provide solutions to reduce it. The main purpose of this study is to concentrate on the results of research undertaken in this area. Thus, the thorough analysis of studies published in the main databases shows that the food industry contributes significantly to the accumulation of greenhouse gases in the atmosphere, the main sources of emissions being agricultural practices, crop rotation, waste management, etc. The urgency of adopting sustainable practices and mitigation strategies in the food industry to minimize the carbon footprint is underlined. Research not only highlights the urgent need to address the environmental impacts of the food industry, but also provides an essential basis for developing policies and strategies for implementing sustainable agricultural practices.

Key words*: agriculture, carbon footprint, food industry, greenhouse gases.*

CONSISTENCY INDEX OF SOILS, CORRESPONDING TO THE STATE OF SATURATION: AN IMPORTANT PARAMETER IN ANTICIPATING THE BEHAVIOR OF COHESIVE SOILS

Ernest Daniel OLINIC[1], Tatiana OLINIC[2]

[1]Technical University of Civil Engineering Bucharest,
122-124 Lacul Tei Blvd, District 2, Bucharest, Romania
[2]University of Agronomic Sciences and Veterinary Medicine of Bucharest,
Faculty of Land Reclamation and Environmental Engineering,
59 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: tatiana.olinic@fifim.ro

Abstract

The physical characteristics of a soil give indication on its mechanical behavior and also offer suggestions in the correct programming of the laboratory tests, which will correctly describe the mechanical behavior of the soil. The plasticity index and the consistency index are two important parameters used to describe the cohesive soils. If the plasticity index is a nature parameter, the consistency index is a state parameter, which describes the state of the soil at its natural moisture content. The consistency index is the difference between the liquid limit and the natural moisture content, divided to the plasticity index. For the calculation of the consistency index corresponding to the state of saturation, the natural moisture content is replaced by the saturation moisture content, a situation in which, for the respective soil, the lowest state of consistency is anticipated in the assumption of its saturation. Beyond the theoretical aspects regarding the definition of this parameter, never previously used in technical literature, being an invention of the authors, the paper presents calculation examples and case studies with an emphasis on collapsible soils and swellings-shrinking soils, which represent difficult foundation conditions.

Key words*: collapsible soils, consistency index, degree of saturation, swelling-shrinking soils.*

MICROFLORA OF THE GROUND AIR FROM "HOT POINTS" AND PARK AREAS

Asen PESHEV, Bilyana GRIGOROVA-PESHEVA, Boyka MALCHEVA, Georgi KADINOV

University of Forestry, Faculty of Forestry, Department of Silviculture, 10 Kliment Ohridski Blvd, Sofia, Bulgaria

Corresponding author email: asenpeshev87@gmail.com

Abstract

The present study aims to track the quantity and distribution of microorganisms in the ground air in "hot points" and park areas of the territory of the city of Sofia. For this purpose, 6 "hot points" were selected, on the territory of boulevards and intersections, and six in the park areas of the capital. The study was carried out using the "Open air" method on suitable solid nutrient media. Each measurement was performed in five replicates. The total microbial number was determined, as well as the amount of the main microbiological groups. The potential presence of streptococci and staphylococci was reported. The data show several times increased levels of the total microflora in the hot spots compared to the green areas. There is also a difference in the percentage participation of the different microbiological groups in the two types of areas studied. In the hot points, fungi represent the main group of microorganisms, followed by bacteria. In green areas, bacteria represent the main group of microorganisms.

Key words: *air microorganisms, air microflora, green zone, hot points.*

BUILDING SUSTAINABILITY: INTEGRATING AGRICULTURAL AND INDUSTRIAL SUB-PRODUCTS IN THE BUILDING SECTOR

Cristian PETCU[1], Claudiu Sorin DRAGOMIR[2], Andreea HEGYI[1]

[1]National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development - URBAN-INCERC, 266 Pantelimon Road, District 2, Bucharest, Romania
[2]University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Land Reclamation and Environmental Engineering, 59 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: dragomirclaudiusorin@yahoo.com

Abstract

The construction sector demand for thermal insulation materials is rising, to enhance building energy efficiency and indoor thermal comfort. While insulation materials like organic foams (EPS, XPS, PUR, PIR) or inorganic fibers (glass or rock wool) are widely used, there is a shift towards eco-friendly alternatives derived from agro-industrial waste. These sustainable options not only reduce operational energy consumption in buildings but also offset some of their own production energy requirements. Furthermore, using such sub-products as insulation materials presents an ecological advantage, contributing to CO_2 sequestration and offering a greener choice in the construction industry. This paper presents the thermal properties of such insulating materials and compares their values with some of the commonly used insulation materials. The thermal conductivity of the materials was assessed using the λ-Meter EP500e, a guarded hot plate apparatus specialized for such measurements, using the instructions outlined in the SR EN 12667 standard, ensuring accuracy and compliance with established guidelines. The paper aims to elevate awareness about the potential of transforming what is currently viewed as agricultural waste into innovative and environmentally friendly building materials.

Key words*: agricultural sub-products, building insulation, thermal conductivity, sustainability.*

ANALYTICAL FRAMEWORK ORIENTED TOWARDS ENVIRONMENTAL TRIGGERS IN EUROPEAN GREAT CITIES

Stefan-Mihai PETREA[1, 2, 4], Ira-Adeline SIMIONOV[1, 2, 5], Alina ANTACHE[1, 2, 6], Aurelia NICA[1], Maxim ARSENI[2, 3], Adrian ROSU[2, 3], Dragos CRISTEA[4], Catalin PLATON[7], Catalina ITICESCU[2, 3]

[1]"Dunarea de Jos" University of Galati, Food Science and Engineering Faculty, 111 Domneasca Street, Galati, Romania
[2]"Dunarea de Jos" University of Galati, REXDAN Research Infrastructure, 98 George Cosbuc Street, Galati, Romania
[3]"Dunărea de Jos" University of Galati, Faculty of Sciences and Environment, 111 Domneasca Street, Galati, Romania
[4]"Dunărea de Jos" University of Galati, Faculty of Economics and Business Administration, 59-61 Nicolae Balcescu Street, Galati, Romania
[5]"Dunărea de Jos" University of Galati, Faculty of Automatic Control, Computers, Electrical Engineering and Electronics, 2 Stiintei Street, Galati, Romania
[6]"Alexandru Ioan Cuza" University of Iasi, 11 Carol I Blvd, Iasi, Romania
[7]"ROMFISH" National Association of Fish Producers, 12A Nicolae Iorga Blvd, Iasi, Romania

Corresponding author email: stefan.petrea@ugal.ro

Abstract

The paper aims to develop a comparative and integrated analytical framework (CIAF) that will ensure an in-depth understanding of environmental triggers in Western (W) vs Eastern (E) Great Cities (GC) of the European Union (EU). Parameters corresponding to both environmental (EVD) and economic (ECD) dimensions were selected for each of the first 10 EU WGC and EGC, respectively. The EVD considers the impact of PM2.5. exposure, as well as municipal waste generation and days of strong heat stress, while the ECD considers the GDP, labour productivity, as well as unemployment rate, all connected to the demographical dynamics of the analysed urban areas. A machine-learning methodology, consisting of MLR and XGBoost algorithms, is used for the development of the CIAF. The results indicate significant peculiarities between both WGC and EGC and reveal high accuracy (>85%) in various prediction scenarios. The findings can be used as a basis for the future development of complex decision-support tools, tackling to optimize the environmental management in EU GC.

Key words*: environmental triggers, great cities, machine learning, municipal waste, PM2.5.*

NEW POSSIBILITIES OF USING THE ASH RESULTING FROM THE ENERGY RECOVERY OF POULTRY LITTER WITHIN THE CIRCULAR ECONOMY CONCEPT

Luminita Georgeta POPESCU[1], Roxana Gabriela POPA[1], Lucica ANGHELESCU[1], Ramona CAZALBAȘU[1], Georgeta PREDEANU[2], Bogdan Stefan VASILE[3]

[1]Constantin Brancusi University of Targu Jiu, 4 Tineretului Street, Gorj County Romania
[2]National University of Science and Technology POLITEHNICA Bucharest, Research Centre of Environmental Protection and Eco-Friendly Technologies, 1-7 Polizu Street, District 1, Bucharest, Romania
[3]National University of Science and Technology POLITEHNICA Bucharest, National Research Centre for Micro and Nanomaterials, 6 Iuliu Maniu Blvd, District 6, Bucharest, Romania

Corresponding author email: luminita.popescu69@gmail.com

Abstract

The increase in domestic poultry production in Romania is a result of the efforts our country is making to limit imports from other countries on one hand, and the development of the poultry sector through domestic investments, on the other hand. In 2022, poultry meat production increased by over 6%, and further increases are expected. In the same dynamic, the amount of aviary waste generated by poultry farms is also increasing, and in these conditions, it is obvious for our concerns to focus on the recovery, recycling, and utilization of avian waste. In this paper, we will present new possibilities for the utilization of ash resulting from the incineration of avian waste. In this case, avian waste is used as fuel, either in addition to biomass or municipal waste, to produce thermal energy.

Key words*: circular economy, incineration waste products, poultry litter ash.*

A DEEP-LEARNING BASED METHOD FOR WASTE DETECTION

Dan-Constantin PUCHIANU

Valahia University of Targoviste, 13 Sinaia Alley,
Targoviste, Romania

Corresponding author email: pdantgv@yahoo.com

Abstract

The integration of advanced deep-learning techniques and object detection architectures represents an advanced methodology for waste detection. Considering the importance of recycling and environmental protection in sustainable waste management, automation of such processes becomes an essential task to improve efficiency and accuracy in various industrial and environmental applications. In this study, a system based on convolutional neural networks is proposed for the identification and classification of different types of waste, such as paper, metal, plastic, or glass. An extensive dataset was used to train and evaluate the proposed models using digital RGB images. Following the experimental results, the implementations of this study demonstrated a detection accuracy of over 90%, highlighting the effectiveness of these models and providing modern solutions for correct waste management and manual sorting errors. Efficient recycling is important for ensuring good environmental sustainability practices and automating the process using deep-learning systems is an important step in this direction.

Key words*: image processing, object detection, pollution, waste management.*

WASTE CLASSIFICATION USING EFFICIENT NEURAL NETWORKS AND WEB APPLICATION

Dan-Constantin PUCHIANU

Valahia University of Targoviste, 13 Sinaia Alley, Targoviste, Romania

Corresponding author email: pdantgv@yahoo.com

Abstract

The integration of convolutional neural networks and modern web applications can significantly improve the efficiency of recycling processes. Accurate, rapid identification and separation of waste of various types reduces contamination by marking a process essential to the efficiency of the recycling industry. In this study, a modern approach for classifying recyclable waste using deep-learning techniques based on convolutional neural networks and integrated into a web application developed using ReactJS is presented. Leveraging the features of advanced deep-learning models and modern web interfaces, the present study aims to make a substantial contribution to the field of efficient waste management and environmental protection. Neural network architectures, trained and evaluated on a carefully annotated dataset, demonstrated very good accuracy values outperforming classical state-of-the-art models. Integrating these models with modern web technologies a web application with an intuitive user interface was built for real-time classification of waste types, providing immediate feedback. In the same framework, implementations with web technologies also provide educational resources regarding recycling practices and the impact of waste on the environment. The impact on the environment is considerable because the development of such established technologies can reduce the amount of waste managed improperly, improving the recycling rate. Future research can explore optimizing the models and techniques presented in this study, expanding the dataset, and developing the application to support good sustainability practices.

Key words*: convolutional neural networks, deep-learning, ReactJS, waste management, web application.*

PREDICTING THE FUTURE TRENDS OF EUROPEAN AND NATIONAL BENCH-MARKS IN THE MANAGEMENT OF BIODEGRADABLE MUNICIPAL WASTE USING ARTIFICIAL NEURAL NETWORKS

Eda PUNTARIĆ[1], Lato PEZO[2], Željka ZGORELEC[3], Jerko GUNJAČA[3], Dajana KUČIĆ GRGIĆ[4], Neven VOĆA[3]

[1]Ministry of Environment and Sustainable Development,
80 Radnicka cesta, Zagreb, Croatia
[2]University of Belgrade, Institute of General and Physical Chemistry,
Studentski trg, 12/V, Belgrade, Serbia
[3]University of Zagreb, Faculty of Agriculture,
25 Svetosimunska cesta, Zagreb, Croatia
[4]University of Zagreb, Faculty of Chemical Engineering and Technology,
19 Marulicev trg, Zagreb, Croatia

Corresponding author email: latopezo@yahoo.co.uk

Abstract

This research employs Artificial Neural Networks (ANN) to develop predictive models for biodegradable municipal waste at both European and national levels. Leveraging socio-demographic and economic data spanning 25 years across 17 European Union (EU) countries, the models aim to forecast biodegradable waste generation over a five-year period. The primary objective is to examine the influence of socio-demographic and economic factors on waste generation. According to the study's findings, it is anticipated that by 2025, the 17 EU countries will produce approximately 67.4 million tons of mixed municipal waste (MMW), 14.7 million tons of municipal paper and cardboard waste (PCW), 6.4 million tons of municipal wood waste (WW), and approximately 0.6 million tons of municipal textile waste (TW). This substantial volume underscores the pressing need for robust infrastructure covering collection, processing, recycling, and disposal mechanisms. The ANN model demonstrated impressive predictive capabilities for MMW, PCW, WW, and TW. Test predictions spanning 2020 to 2025 revealed R2 values ranging between 0.965 and 0.998 during the training phase for the output variables.

Key words*: artificial intelligence, Europe, reduction of municipal waste, quantity estimation, waste generation, waste management.*

ASSESSING ACCURACY OF LOW-COST COMPACT SYSTEM VERSUS STANDARD AIR QUALITY SYSTEMS

Adrian ROSU[1, 2], Daniel-Eduard CONSTANTIN[1, 2], Mirela VOICULESCU[1, 2], Silvia DRĂGAN[4], Maxim ARSENI[1, 2], Stefan-Mihai PETREA[2, 3], Catalina ITICESCU[1, 2], Lucian Puiu GEORGESCU[1, 2]

[1]"Dunarea de Jos" University of Galati, Faculty of Sciences and Environment, 111 Domneasca Street, Galati, Romania
[2]"Dunarea de Jos" University of Galati, REXDAN Research Infrastructure, 98 George Cosbuc Street, Galati, Romania
[3]"Dunarea de Jos" University of Galati, Food Science and Engineering Faculty, 111 Domneasca Street, Galati, Romania
[4]EnviroEcoSmart S.R.L., 189 Tecuci Street, Galati, Romania

Corresponding author emails: rosu_adrian_90@yahoo.ro, adrian.rosu@ugal.ro

Abstract

Air pollution has emerged as a pressing concern in large urban areas, often stemming from sources like intensified traffic and industrial activities within city limits. Addressing this issue requires an understanding of air quality levels, leading to the adoption of low-cost, portable air quality monitoring systems. In our research, we conducted tests using a compact mobile air quality system, SNIFFER 4D (SN), comparing its performance against conventional air quality monitors utilizing standardized methods such as chemiluminescence and spectrometry. The equipment was stationed at the REXDAN research facility situated along one of Galati city's main roads. The primary objective of our study was to evaluate the reliability and suitability of the SN for detailed analysis of trace gases like NO_2, O_3, and PM_{10}, by cross-referencing data with readings from standard instruments capable of measuring individual trace gases. Data collection spanned from August 17 to August 30, 2023. Our findings indicate that the SN system proved to be a stable and sophisticated tool for conducting high-resolution studies on local and regional air pollution, encompassing pollutants such as NO_2, O_3, and PM_{10}.

***Key words**: Low-cost air quality monitoring systems, air pollution, air quality station, standard air quality system; trace gases; PM_{10}.*

STUDIES ON THE CURRENT CONTEXT OF AIR QUALITY INSIDE EARTHEN BUILDINGS

Vasilica VASILE, Cornelia BAERĂ, Aurelian GRUIN, Adrian-Alexandru CIOBANU, Bogdan BOLBOREA

National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development - URBAN-INCERC, 266 Pantelimon Road, District 2, Bucharest, Romania

Corresponding author email: vasile@incd.ro

Abstract

A global problem that affects almost all areas of life is the environmental pollution, and because people stay indoors about 80-90% of their day, it can say that indoor air pollution is most of concerns. The growing attention paid to the use of natural materials has become a current topic among researchers, due to the increasing need to exploit renewable materials, conserve energy and adopt sustainable production methods to create buildings adapted to modern times. Although, earth might be considered, from a current perspective, an ancient building material, between 30 and 50% of the XXI century population lives in dwellings made of earth. In this respect, our studies focused on exploring the current status of worldwide researches on air quality inside earthen buildings, in order to establish the performance indicators related to this field. The findings highlight the need to rethink the way in which indoor spaces are designed and operated given the waste generation, resource depletion and climate change, with increasing numbers of people which want to live in environmentally friendly and healthy buildings.

Key words*: earthen buildings, health effects, indoor air pollution, performance indicators.*

ACOUSTIC ABSORPTION CHARACTERISTICS THAT ARE USED IN THE ACOUSTIC DESIGN OF INTERIORS - COMPARISONS BETWEEN SOME CLASSICAL MATERIALS AND NATURAL, ECOLOGICAL MATERIALS

Marta Cristina ZAHARIA[1, 2], Daniela DOBRE[1, 3], Claudiu Sorin DRAGOMIR[1, 2]

[1]National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development - URBAN-INCERC, 266 Pantelimon Road, Bucharest, Romania
[2]University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Land Reclamation and Environmental Engineering, 59 Marasti Blvd, District 1, Bucharest, Romania
[3]Technical University of Civil Engineering of Bucharest, 124 Lacul Tei Blvd, District 2, Bucharest, Romania

Corresponding author email: marta_cristina_zaharia@yahoo.co.uk

Abstract

In the case of the acoustic design of some rooms, such as audition rooms, classrooms for education, etc., the knowledge of the acoustic absorption characteristics of the materials/products that will be used for the interior surface finishes (walls, floors, ceilings) is of particular importance. Depending on the activity that takes place in the room, it is necessary to obtain a certain value of the reverberation time in order to achieve acoustic comfort. In many research projects, carried out in INCD URBAN INCERC, INCERC Bucharest Branch, laboratory experiments were carried out on some types of classic materials (polyethylene, felt in plates of basaltic mineral wool) or natural, ecological materials (wool for use in construction, or wooden boards, etc.). The research ware carried out in the reverberation chamber in the Building Acoustics Laboratory. The results of the studies are presented in the article as acoustic absorption coefficient in the diffuse field, `$\alpha_s$`, in graphical forms of frequency range 100 to 5000 Hz and as the evaluation acoustic absorption coefficient `$\alpha_w$` and are compared considering the influence of the physical characteristics of the tested materials.

Key words*: absorption coefficients, acoustics, civil buildings, reverberation.*

ASSESSING THE EFFICIENCY OF TRANSPORT INFRASTRUCTURE INVESTMENTS IN ROMANIA: A MULTIDIMENSIONAL APPROACH

Petru NICOLAE

Romanian Academy, School of Advanced Studies of the Romanian Academy, Doctoral School of Economic Sciences, National Institute for Economic Research "Costin C. Kirițescu", 13 Calea 13 Septembrie, Bucharest, Romania

Corresponding author email: nicolae.petru@gmail.com

Abstract

Transport infrastructure plays a crucial role in the economic development and environmental sustainability of any region. This study focuses on evaluating the efficiency of transport infrastructure investments in Romania, examining their social, economic, and environmental impacts. The research adopts a comprehensive approach, integrating data from national and European sources to assess the long-term effects of these investments. Key findings highlight the need for a balanced investment strategy that considers energy consumption, pollutant emissions, land use and socio-economic inclusion. The study also proposes a methodology for determining the congruence factor, which balances environmental, social, and economic criteria to optimize infrastructure performance. These insights aim to guide policymakers in making informed decisions to promote sustainable development in the transport sector.

Key words*: transport infrastructure, investment efficiency, environmental impact, socio-economic development, sustainable development, Romania, congruence factor, policy guidance.*

DECARBONIZING IRRIGATION SYSTEMS: INNOVATIVE TECHNOLOGIES FOR ENERGY EFFICIENCY AND SUSTAINABLE WATER RESOURCE MANAGEMENT

Petru NICOLAE

Romanian Academy, School of Advanced Studies of the Romanian Academy, Doctoral School of Economic Sciences, National Institute for Economic Research "Costin C. Kirițescu", 13 Calea 13 Septembrie, Bucharest, Romania

Corresponding author email: nicolae.petru@gmail.com

Abstract

Decarbonizing irrigation systems plays a pivotal role in mitigating climate change and promoting sustainable agricultural practices. This study explores advanced technological solutions to enhance the energy efficiency and sustainability of water resource management in irrigation systems. By leveraging innovations such as floating photovoltaic panels, smart irrigation controls, and renewable energy integration, this research aims to reduce dependency on fossil fuels and optimize water usage. The analysis encompasses the socio-economic and environmental impacts of these technologies, highlighting significant benefits including reduced greenhouse gas emissions, improved water conservation, and bolstered local economic development. The study offers a comprehensive methodology for achieving a balanced congruence factor that aligns environmental, social, and economic criteria, providing valuable insights for policymakers to encourage sustainable infrastructure investments.

Key words*: irrigation system decarbonization, energy efficiency, floating photovoltaic panels, smart irrigation, renewable energy integration, sustainable water management, environmental impact, socio-economic benefits, climate change adaptation.*

SUSTAINABLE DEVELOPMENT OF RURAL AREA

URBAN PARADOX: AN ANALYTICAL PERSPECTIVE RETHINKING SUSTAINABLE LAND AREAS

Gabriela BANADUC, Cornelia BAERA, Anca DRAGHICI

Politehnica University Timisoara, 2 Piata Victoriei, Timisoara, Romania

Corresponding author email: gabriela.banaduc@student.upt.ro

Abstract

The paper aims to characterize the urban - rural areas relationship in the context of actual urbanization effects. Cities are marked by several social inequalities. These polarized opportunities of the urban environment which are often mirrored in contrast to the rural environment, as patterns of inequality in cities vs rural localities are considerable and generally more widespread. Facing these challenges, accompanied by the determining phenomena of the rapid growth of the urban population, led to extensive debates that had a significant impact on the local development strategy. Thus, a strong movement was generated to reach the clean natural environment, which is called the urban paradox. In the current research, the complex phenomenon of urbanization will be approached from three perspectives: (1) the capacity of cities to open up for including rural landscape as an opportunity to expand sustainable infrastructure; (2) the government ability to promote greener, more sustainable living; (3) the ability to share and provide all urban and rural residents with access to a more sustainable environment (related to the Sustainable Development Goals).

Key words*: funds, inclusion, rural area, sustainable development, urbanization.*

STUDY ON THE SOILS OF THE GORJ COUNTY AND THE LIMITING FACTORS OF THEIR QUALITY, IN ORDER TO IMPROVE THEM

Mihaela BĂLAN, Cristian POPESCU

University of Craiova, Faculty of Agronomy, 19 Libertatii Street, Craiova, Romania

Corresponding author email: popescucristian07@yahoo.com

Abstract

This study aimed at inventorying the soils of the Gorj County, classifying them into quality classes and identifying the limiting factors of their quality. Thus, eight soil classes were identified over an area of 192,405.22 ha and soil complexes and associations over an area of 51,362.78 ha. As far as soil quality is concerned, the soils have been divided into quality classes which were done following the 1:10,000 scale survey. The assessment was made according to soil, relief and climate and it was revealed that the largest agricultural area, i.e. 140,898 ha, which represents 57.8% of the total agricultural area, falls into the fourth quality class, which demonstrates the complexity of the relief and soils in the Gorj County. As far as soil quality limiting factors are concerned, it was found that they can be grouped into three main groups: soil-dependent limiting factors (texture, porosity, reaction, $CaCO_3$ content, nutrients content); limiting factors dependent on terrain factors <other than soil> (slope, erosion, landslides) and limiting factors caused by anthropogenic activities (pollution).

Key words*: land assessment, limiting factors, nutrients content quality, soil.*

TECHNOLOGIES FOR REDUCING CARBON DIOXIDE EMISSIONS IN AGRICULTURE

Ioan GAICA, Madalina IORDACHE, Narcis BAGHINA, Daniel Dorin DICU, Lucretiu DANCEA

University of Life Sciences "King Mihai" from Timisoara,
119 Calea Aradului, Timisoara, Romania

Corresponding author email: ioangaica@usvt.ro

Abstract

Carbon management is necessary for a variety of problems such as climate change, land productivity, water management, etc. The objective of this work is the development of technological alternatives with low carbon dioxide emissions and carbon sequestration in biomass and soil, and the use of agricultural practices that lead to an increase in the soil`s capacity to store carbon. Agricultural land is a major carbon sink due to photosynthesis and the storage of CO_2 in living and dead organic matter. To calculate the amount of carbon fixed by a crop, the biomass production obtained is considered. Improving the physico-chemical characteristics of the soil leads to an increase in activity of microorganisms in the soil, through their activity they store carbon in the soil layers in more stable forms over time. The transition to a conservative farming system that leads to a decrease in the loss of organic matter by establishing crop rotations with improving plants, the use of manure instead of chemical fertilizers, the incorporation of plant residues, and achieves an increase in the carbon sequestration rate.

Key words*: conservative farming, carbon sequestration, emission.*

MODERNIZATION/REHABILITATION OF THE SECONDARY DRAINAGE INFRASTRUCTURE BY REPOSITIONING EXISTING CHANNELS AND BY ASSIGNING THE DUAL ROLE OF DRAINAGE-IRRIGATION

Marin-Vasile ILCA[1], Teodor Eugen MAN[1], Robert BEILICCI[1], Anisoara IENCIU[2], Daniela-Cristina UNTARU[1], Mariana Antonia PASC[2]

[1]Politehnica University Timisoara, 1A Spiru Haret Street, Timisoara, Romania
[2]University of Life Sciences "King Mihai I" from Timisoara, 119 Calea Aradului, Timisoara, Romania

Corresponding author email: marin-vasile.ilca@student.upt.ro

Abstract

The paper deals with the need to modernize the existing secondary drainage infrastructure, in an effort to implement new water management strategies, in line with current needs, including a case study that proposes a solution in this sense, by designing a drainage-irrigation system based on the optimization and systematization of the agricultural surface taken into account, the efficiency of the water circuit and last but not least, the achievement of reduced water consumption. Drainage and irrigation systems represent an important element in the complex equation of agriculture, their management being able to make the difference between performance and failure, hence the importance of consolidating the optimal strategy regarding the design, modernization and ensuring their functionality. In geographical areas with excess humidity, it was necessary to build drainage systems to remove excess water from the land to make it arable, through land improvement works as support for agriculture, similar works executed in Romania between 1950-1989 which, especially due to its age, requires restoration/modernization. Considering the modernization of agricultural technologies, the introduction on a larger scale of a new mindset on more environmentally friendly agricultural systems, global climate changes, etc., the rehabilitation and modernization of the secondary infrastructure within the old drainage facilities is currently necessary and timely. - drainage, where the technical conditions allow their transformation into complex drainage and irrigation facilities. The paper presents a case study in this sense, from which derives the need to make some legislative changes that will have to be made to facilitate the promotion of such complex facilities desiccation - drainage and irrigation.

Key words: *drainage-irrigation canals, repositioning, system modernization.*

EXPERIMENTAL RESEARCH OF THE INNOVATIVE ATMOSPHERIC HUMIDITY COLLECTION SYSTEM FOR USE IN CROP IRRIGATION

Dragoș MANEA, Eugen MARIN

National Institute of Research and Development for Machines and Installations Designed for Agriculture and Food Industry - INMA Bucharest, 9 Ion Ionescu de la Brad Blvd, District 1, Bucharest, Romania

Corresponding author email: manea_dragos_05@yahoo.com

Abstract

This paper presents the experimental results of an innovative atmospheric humidity collection system for irrigating crops. A humidity and temperature transducer located outside reads the temperature and relative humidity of the atmospheric air. Another transducer located on the indoor unit reads the temperature and humidity of the air leaving the humidification chamber. The controller monitors the temperatures and humidities transmitted by the transducers and when the optimal conditions are met for water to condense on the surface of the external collector, it commands the heating and humidification of the air to start. The system operates until the conditions for humidity condensation are no longer satisfied. The meteorological parameters provided by the local weather station related to the conditions under which water condenses was obtained and led to the adjustment of the automatic algorithm. During the experiments, the following parameters were determined: the flow rate of air pushed by the in-line duct fan, the temperature and humidity of the air jets at the exit from the hot air duct and the volume of water obtained.

Key words*: atmospheric humidity, dew point, water.*

ZOOTECHNICAL WASTE AS RAW MATERIAL FOR BIOGAS PRODUCTION AND AS FERTILIZER FOR AGRICULTURE

Roxana MITROI[1], Cristina Ileana COVALIU-MIERLĂ[1], Cristina-Emanuela ENĂŞCUŢĂ[2], Grigore PSENOVSCHI[1, 2]

[1]National University of Science and Technology POLITEHNICA Bucharest, 313 Splaiul Independentei, District 6, Bucharest, Romania
[2]National Institute for Research & Development in Chemistry and Petrochemistry - ICECHIM, 202 Splaiul Independentei, District 6, Bucharest, Romania

Corresponding author email: cristina_covaliu@yahoo.com

Abstract

In recent times, the anaerobic fermentation process of animal waste has become a promising solution for biogas production through anaerobic digestion. Anaerobic digestion technology is considered not only an environmental solution but also a potential source of energy, contributing to solving economic and social issues. This research has explored the potential of using poultry, cow and pig manure, to produce biogas through the anaerobic digestion process. Animal farming produce significant quantities of waste and thus exert a negative action on the environment. The animal waste resulting from zootechnical activities can represent an important resource to produce renewable. Furthermore, by using animal waste and plant residues as organic materials to produce biogas, we are not only reducing the quantities of waste illegally dumped along riverbanks or in landfills. In this research paper, the objective was to develop an optimal mixture of animal waste and agro-food byproducts to produce biogas.

Key words*: anaerobic digestion, biogas, cow manure, pig manure, poultry manure.*

RESEARCHES FOR THE PHYSICO-CHEMICAL CHARACTERIZATION OF SOME GRANULAR FERTILIZERS OBTAINED FROM NATIVE WOOL WASTE, IN ORDER TO USE THEM IN AGRICULTURE

Elena Mihaela NAGY, Teodor Gabriel FODOREAN, Dragos NICA, Evelin Anda LAZA

National Institute of Research - Development for Machines and Installations Designed to Agriculture and Food Industry - INMA, 6 Ion Ionescu de la Brad Blvd, District 1, Bucharest, Romania

Corresponding author email: nagy_m2002@yahoo.co.uk

Abstract

Wool waste production cannot be avoided, so reuse and recycling are the best solutions for managing this keratinous waste. At present, in Romania, wool in different forms - raw or washed wool, pelleted wool or wool hydrolysate - is used in agriculture on a relatively small scale, both as a fertilizer and to improve certain physical characteristics of the soil. A good knowledge of the physico-chemical properties of wool-based fertilizer granules will also contribute to increasing the use of this resource. In this research, the characteristics of some wool granules produced in Romania were studied, such as bulk density, granule moisture, water absorption, compressive strength, and the effect of alkaline hydrolysate obtained from them on soil-beneficial bacteria of the Bacillus genus and Rhizobium genus. Among the results obtained, it should be mentioned that the water absorption capacity of the granules is around 200%. Also, the research proved that the alkaline hydrolysate obtained from the wool pellets studied does not show inhibitory effect on the Bacillus and Rhizobium species tested.

Key words*: hydrolysate, granular fertilizer, physico-chemical characteistics, wool.*

IMPROVING PRODUCTIVITY ON DEGRADED LANDS USING A NOVEL TECHNOLOGY OF CULTIVATING CROPS IN BIODEGRADABLE MULTILAYERED STRUCTURES

Florin NENCIU[1], Eugen POPESCU[1], Lorena-Diana POPA[2], Gabriel NAE[1], Andreea MATACHE[1]

[1]National Institute of Research - Development for Machines and Installations Designed for Agriculture and Food Industry Bucharest - INMA, 6 Ion Ionescu de la Brad Blvd, District 1, Bucharest, Romania
[2]Agricultural Research and Development Station Secuieni, 377 Pricipala Street, Secuieni, Neamt, Romania

Corresponding author email: florin_nenciu2000@yahoo.com

Abstract

Integrating degraded or contaminated lands into food production chains poses significant challenges and expenses. This study explores a novel technology for cultivating vegetables on degraded lands employing vegetal substrates in the form of bales. These multi-layered vegetal structures are strategically designed to offer essential support, nutrients, water, warmth, and protection against pests for the cultivated plants. The fertile layer within these structures was produced through composting vegetable waste produced from horticulture. The protective surface of the bale was made from a mixture of agricultural wastes, ensuring both a resilient structure and permeability. The structure was enhanced with two layers made of recycled cotton, aimed at retaining moisture efficiently. The research showed that the adopted technological solution can yield a 30-40% improvement in production of tomato and eggplant. Moreover, it demonstrates high adaptability, being easily applicable for crops establishing in contaminated, degraded environments, or even on concrete surfaces.

Key words*: composting, cultivation in bales, degraded soil.*

DETERMINING GREENHOUSE GAS EMISSIONS RESULTING FROM ENERGY AND WATER CONSUMPTION FOR THE DECARBONIZATION OF CORN PRODUCTION AND DEVELOPING STRATEGIES TO REDUCE THE CARBON FOOTPRINT

Hasan Hüseyin ÖZTÜRK[1], Bülent AYHAN[2], Serdar AYGÜN[3], Ali GÜL[4], Serkan KARABAĞLI[4]

[1]University of Cukurova, Faculty of Agriculture, Sarıcam, Adana, Türkiye
[2]Ministry of Agriculture and Forestry, Adana Agricultural Production and Agricultural Extension and Training Center, Adana, Türkiye
[3]General Directorate of Meteorology, Keçiören, Ankara, Türkiye
[4]Ministry of Agriculture and Forestry, Department of Education and Publications, Ankara, Türkiye

Corresponding author email: hhozturk@cu.edu.tr

Abstract

This study aimed to determine greenhouse gas emissions (GHG) resulting from energy and water consumption in corn production and to define carbon footprint (CFP) indicators. As fuel consumption for corn production processes, diesel fuel and engine oil consumed by the tractor engine were taken into account. In the calculations made to determine carbon dioxide (CO_2) emissions resulting from fuel use, the fuel-based CO_2 emission calculation method recommended by the Intergovernmental Panel on Climate Change (IPCC) have been followed. The individual determination of carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) emissions related to fuel consumption and their conversion into CO_2 equivalent emissions are explained. The environmental sustainability effectiveness of corn production was evaluated as the carbon footprint (CFP) of energy and water consumption. Carbon footprint indicators for energy and water consumption have been defined.

Key words*: carbon footprint, fuel, greenhouse gas emissions.*

SUSTAINABLE DEVELOPMENT OF AN RURAL AREA IN PROTECTED TERRITORY - A CASE STUDY FROM BULGARIA

Slaveya PETROVA, Bogdan NIKOLOV, Dimitar TOKMAKOV, Slavi LYUBOMIROV, Rumen POPOV, Stanislav ASENOV, Iliana VELCHEVA, Vesela YANCHEVA, Elenka GEORGIEVA, Stela STOYANOVA

Paisii Hilendarski Plovdiv University, 24 Tzar Asen Street, Plovdiv, Bulgaria

Corresponding author email: slaveya_petrova@uni-plovdiv.bg

Abstract

Sustainable development is based on three pillars: sustainable economic growth, social well-being and environment protection. Sustainable rural development is regarded as a multidimensional concept including an equitable and balanced development within a rural area, an increased level of social cohesion and equitability, as well as the assuming of responsibility for using natural resources and revealing at environmental protection. The studied region is located into the Strandzha Mtn - the only Bulgarian territory included in the five priority territories for conservation in Central and Eastern Europe. We have identified some core problems that should be addressed aiming at to achieve the sustainable development of this area. Some of them are as follows: the absence of developing projects and focus on the development of individual villages, the lack of will to cooperate, local resources are not effectively used and the local community is not adequately involved.

Key words*: biodiversity, rural tourism, ecotourism, ecosystem services*

SUPERIOR CAPITALIZATION OF VEGETABLE WASTE AND NATURAL AGRO-INDUSTRIAL BY-PRODUCTS BY CREATING INNOVATIVE PRODUCTS FOR CONSTRUCTION. SOCIO-ECONOMIC PREDICTIVE ANALYSES

Irina POPA, Vasilica VASILE, Silviu LAMBRACHE

National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development - URBAN-INCERC, 266 Pantelimon Road, District 2, Bucharest, Romania

Corresponding author email: irinapopa2006@yahoo.com

Abstract

To ensure environmental preservation, it is increasingly necessary to capitalize on waste, both from agriculture and related industries. There is currently research at the worldwide level on the capitalizing of vegetable waste and natural agro-industrial by-products in the field of construction, to obtain innovative materials, which can replace traditional materials. The capitalization of waste ensures not only the reduction of the impact on the environment due to their recovery but also the possibility of a cost efficiency compared to the use of traditional materials. Waste recovery is a priority component of sustainable development, aiming to create the conditions for ensuring the well-being of countries and their citizens and implementing global measures to manage natural resources. In this context, our studies focused on determining the economic efficiency of innovative materials, obtained by capitalization of some types of vegetal waste, being necessary to perform a comparative cost analysis. The acquisition costs related to innovative, environmentally friendly materials and those traditionally used in construction were taken into account, as well as the costs during their use, respectively the maintenance and repair costs.

Key words*: agro-industrial by-products, predictive analyses, sustainable development, waste capitalization.*

RICE HUSKS AND THEIR POTENTIAL FOR USE IN CONSTRUCTION

Irina POPA, Cristian PETCU, Adrian SIMION, Daniela STOICA, Alina DIMA

National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development - URBAN-INCERC, 266 Pantelimon Road, District 2, Bucharest, Romania

Corresponding author email: irinapopa2006@yahoo.com

Abstract

The growing global demand for agricultural food products has inevitably led to increased amounts of natural agro-industrial by-products. Derived from agricultural and industrial processes, these by-products have traditionally and conservatively been considered waste, and their management represents significant environmental challenges. Currently, the potential of this type of natural materials to be reused in new products with added value is recognized, thus contributing to the development of the circular economy at international level but also in Romania. Current research trends in the field of sustainable construction emphasize the numerous benefits of using natural materials in the development of green building products. The paper presents a series of experimental laboratory research with the aim of studying the potential of rice husk, a natural agro-industrial by-product resulting from the food industry, to be used in construction.

Key words*: agro-industrial by-products, sustainable development, waste capitalization.*

WATER EROSION OF SOILS IN THE HILLY AREA OF DOLJ COUNTY - ASSESSMENT, CONTROL AND MITIGATION METHODS

Cristian POPESCU, Mihaela BĂLAN, Marius-Nicolae CIOBOATĂ

University of Craiova, Faculty of Agronomy,
19 Libertatii Street, Craiova, Romania

Corresponding author email: mihaela_balan_if@yahoo.com

Abstract

Erosion is a process of soil and land degradation, which occurs on a large scale, both in our country and worldwide. Due to its specific characteristics, the study area from the hilly part of Dolj County presents relief, climatic, lithological, hydrological, and vegetation conditions, which have contributed over time and continue to contribute today, to the manifestation of the erosion process, through which the productive capacity of the soils is degraded or diminished. In the reference area, soils subjected to surface water erosion encountered on lands with uniform slope, were identified and evaluated, where slow geological erosion has gradually but permanently removed the solidified surface layer. On slopes with a steep gradient, where deep erosion occurs, strongly eroded soils with gullies and ravines have been identified. By identifying the causes that have produced and continue to produce these shortcomings, and based on the morpho-physico-chemical properties of the investigated soils, the most relevant methods of control and combating water-caused erosion were established (agro-improvement works and hydro-ameliorative works).

Key words: *control measures, prevention, soil degradation, water erosion.*

FOREST DEBRIS-BASED BIOCHAR APPLICATION IN COMPOSTING PROCESS TO REDUCE GREENHOUSE GAS EMISSIONS: A NATURE BASED SUSTAINABLE SOLUTION

Rupesh SINGH, Henrique TRINIDADE, João Ricardo SOUSA

University of Trás-os-Montes and Alto Douro (UTAD),
Centre for the Research and Technology of Agro-Environmental and Biological Sciences, Quinta de Prados, Apartado 1013, Vila Real, Portugal

Corresponding author email: rupesh@utad.pt

Abstract

Biochar is being produced from biosolids waste of several industrial sectors, including Agri industries by pyrolysis process. Present investigation aims to evaluate the biochar, produced from forest debris. Animal farming is a major agri industry and produce huge amount of waste solids and liquid fractions which are major source for composting of organic residues. Large amount of greenhouse gases (carbon dioxide, methane, nitrous oxide) and ammonia are released to the environment during composting process and became a major concern for environmental health. The solid biowaste from cattle farm was inoculated with biochar and emissions of methane, carbon dioxide, nitrous oxide and ammonia was measured in comparison to control. Present study may develop a sustainable method in composting process to reduce the greenhouse gas emissions and improve the environmental health for a better tomorrow.

Key words*: biochar, greenhouse gases, environmental health, sustainable composting process, nature-based solutions.*

EVALUATING GREEN AND BLUE INFRASTRUCTURE IN URBAN AREAS IN ROMANIA: A METHODOLOGICAL APPROACH

Teodora UNGUREANU[1], Andreea Cătălina POPA[1], Claudiu-Sorin DRAGOMIR[2]

[1]National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development - URBAN-INCERC, 266 Pantelimon Road, District 2, Bucharest, Romania
[2]University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Land Reclamation and Environmental Engineering, 59 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: teodora.ungureanu@incd.ro

Abstract

This study explores the potential of implementing analysis indicators in the Romanian context to enhance the development and maintenance of green and blue urban infrastructure. Previous studies on GBUI have primarily focused on larger scales, considering cities or territories, to understand connectivity and positive impacts. However, in Romania, green and blue infrastructure in urban areas has received less attention for analysis and development. To understand the impact of GBUI at a neighbourhood level, the study proposes the development of specific indicators that consider the urban form, functional zoning, and the provision of public urban green and blue spaces regarding housing and urban amenities. This research utilises international practice, scientific literature, and national legislation to understand new mechanisms for urban design and sustainable development. It maps indicators for GBUI analysis and design, contributing to a new methodological approach in the Romanian context. This research`s findings can guide the design and development of new residential areas, thereby improving the quality of urban life through improved green and blue urban infrastructure.

Key words*: green and blue urban infrastructure, sustainable urban development, sustainable housing, urban areas.*

INDUSTRIAL WASTES USED AS ADDITIVES IN BUILDING MATERIALS TO REDUCE ENVIRONMENTAL POLLUTION

Mihai VRABIE[1,2], Nicolae APOSTOLESCU[1], Maria HARJA[1]

[1]"Gheorghe Asachi" Technical University of Iasi, Faculty of Chemical Engineering and Environmental Protection, 73 Mangeron Blvd, Iasi, Romania
[2]S.C. Gemite RO SRL, 52 S.F. Petru Movila Street, Iasi, Romania

Corresponding author email: maria_harja@yahoo.com

Abstract

Environmental pollution is a major issue that we are dealing with at the moment. The reuse of industrial waste, which is used as raw materials in other industries such as the construction materials industry, is a beneficial way to reduce pollution. This is possible due to the physical, chemical, and mineralogical properties of industrial waste.
Examples of industrial waste that can be used for obtaining new building materials are: fly ash, furnace slag, silica fume, and so on. These wastes were analysed in this study using the following techniques: SEM, XRD, and EDAX. After characterization, the wastes were used as additives in cement-based materials. The following properties of the obtained materials were tested: compression strength, flexural strength, adhesion to the substrate, and shrinkage testing. Based on the results of the tests, the percentages used as waste addition were chosen.

Key words: *cement-based materials, fly ash, furnace slag, silica fume.*

DISASTER MANAGEMENT

RECYCLING OF STEEL FURNACE SLAGS (SFS) BY EFFICIENT INTEGRATION IN CONSTRUCTION MATERIALS AS AGGREGATE PARTIAL REPLACEMENT

Cornelia BAERĂ[1, 2], Aurelian GRUIN[1, 3], Ana-Cristina VASILE[1, 3], Bogdan BOLBOREA[1, 3], Alexandru ION[1], Gabriela BĂNĂDUC[2, 4]

[1]National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development - URBAN-INCERC, Timisoara Branch, 2 Traian Lalescu Street, Timisoara, Romania
[2]Politehnica University Timisoara, Faculty of Management in Construction and Transportation, 14 Remus Street, Timisoara, Romania
[3]Politehnica University Timisoara, Faculty of Civil Engineering, 2 Traian Lalescu Street, Timisoara, Romania
[4]Caransebes City Hall, Service of Programs, Projects and Strategies, Directorate for Strategies, Programs and Environmental Protection, 1 Revolution Square, Caransebes, Caras-Severin County, Romania

Corresponding author email: cornelia.baera@upt.ro

Abstract

Slags, mixtures of mainly metal oxides and silicon dioxide, represent by-products or wastes generated by the ore smelting processes. There are several types of slags, but for construction applications as recycling possibilities, there are generally used slags generated by iron and steel making industry. The present study is focused on electric arc furnace slags (EAF), produced, and stored in the western part of Romania, Caransebeș County. The current slag deposit has been operating on this site since 1771, with the establishment of the furnaces to produce cast iron in Reșita. This paper presents a preliminary experimental study on the possibilities of using the Reșița SFS slags as a partial substitute for aggregate in cementitious materials for the construction industry. The opportunity and necessity of the proposed research direction cover several purposes: waste management implementation, environmental protection and natural resources saving, for the Circular Economy (CE) implementation in the Romanian industry. The initial results emphasise the concept's viability applied to the Reșita slag landfill, encouraging further exploration of this environmental engineering topic.

Key words*: Circular Economy, construction eco-materials, mineral addition, steel furnace slag (SFS), waste recycling.*

EFFICACY OF THE SEISMIC ISOLATING SYSTEMS FOR HISTORICAL BUILDINGS UNDER MODERATE SEISMIC FORCES

Stefan Florin BALAN, Bogdan Felix APOSTOL, Anton DANET

National Institute of R-D for Earth Physics, 12 Calugareni Street, Magurele, Ilfov, Romania

Corresponding author email: sbalan@infp.ro

Abstract

National Institute of R-D for Earth Physics is in charge at national level with the task of monitoring the seismicity of the country. For this, it is used a well-developed seismic network with a good coverage of the Romanian territory. Beside the free field network of sensors, there is a number mounted on some buildings, used to evaluate their response to a large range of seismic events. The aim of the paper is to demonstrate the efficacy of the isolation systems of two buildings, situated in Bucharest, during earthquakes. The goals will be achieved through analyzing the seismic response in terms of engineering parameters given by the sensors located at key levels, i.e. under and right above isolating devices. The results show the reduction of the seismic loads above the isolators hence the successful use of this type of technique for older buildings of certain design, exposed to Vrancea seismicity and Bucharest subsoil specificity. Conclusions are drawn about the effectiveness of the isolation system on both structures, as part of a solution in specific cases for seismic risk mitigation.

Key words*: base-isolating technique, seismic response analysis, moderate Vrancea earthquakes, seismic isolated buildings.*

INFLUENCE OF EXTREME WEATHER PHENOMENA ON THE MANAGEMENT OF DECIDUOUS FORESTS

Ghita Cristian CRAINIC[1], Flavius IRIMIE[2], Flavia IRIMIE (CIOFLAN)[1], Sorin Lucian DOROG[1], Călin Ioan IOVAN[1], Eugenia ŞERBAN[1]

[1]University of Oradea, 1 Universitatii Street, Oradea
[2]"Ştefan cel Mare" University of Suceava, 13 Universitatii Street, Suceava, Romania

Corresponding author email: eugeniaserban@yahoo.com

Abstract

The extreme meteorological phenomena, from the date of 17 09 2017, caused a series of destructions especially in the deciduous stands within the Sudrigiu Forestry District, Bihor Forest Department stands, in the western part of the country. As a result, a number of stands of species from the deciduous group were affected in the Văratec Forest Management Unit (FMU) VII, with reported windfalls and wind breaks, on compact surfaces of approximately 929 hectares. The volume of the affected trees, which was inventoried as accidental products, is about 94,000 m3. The appearance of these by-products seriously disrupted the management of the stands in the affected forest units, causing a series of major disruptions in the valorization process of the main and secondary wood products, with major implications on the regeneration process of the deciduous stands, which was in progress, at that moment. Although substantial amounts of money were recorded during the valorization of accidental wood products, a relatively high percentage of the wood was depreciated and was not recovered at a level corresponding to the main wood products.

Key words*: accidental products, deciduous stands, extreme meteorological phenomena, natural regeneration, secondary wood products.*

THE EVOLUTION OF THE DYNAMIC CHARACTERISTICS OF THE SOIL-STRUCTURE SYSTEM IN CASE OF A UNIVERSITY BUILDING SEISMIC MONITORING

Daniela DOBRE[1, 2], Claudiu-Sorin DRAGOMIR[1, 3], Cornelia-Florentina DOBRESCU[1, 4], Iolanda-Gabriela CRAIFALEANU[1, 2], Emil-Sever GEORGESCU[1], Marta-Cristina ZAHARIA[1, 3]

[1]National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development - URBAN-INCERC, 266 Pantelimon Road, District 2, Bucharest, Romania
[2]Technical University of Civil Engineering of Bucharest, 124 Lacul Tei Blvd, District 2, Bucharest, Romania
[3]University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Land Reclamation and Environmental Engineering, 59 Marasti Blvd, District 1, Bucharest, Romania
[4]"Dunarea de Jos" University of Galati, 47 Domneasca Street, Galati, Romania

Corresponding author email: ddobre71@gmail.com

Abstract

In Romania, there are several legislative guidelines regarding the activity of seismic instrumentation/monitoring, which can support this activity in a coherent and effective way (Seismic Design Code, P 100-1/2013, Annex A). The monitoring of the Faculty of Biotechnology building is carried out using 3 Granite triaxial sensors, arranged one each on the top, in the basement and in the free-field. For each of the recordings, the Fourier spectrum, also response and power spectrum, can be represented, using different options related to axes, corrections etc. The processing of the records leads to the determination of the instantaneous maximum values of the accelerations, velocities, displacements. A comparative analysis over time will be presented for the level of vibrations recorded and for the frequency range obtained in free-field, basement, top conditions, as well as an analysis of vibrations from an ambient comfort point of view. Beyond the legislative aspects, this activity responds to the need to know both the characteristics of earthquakes and the structural characteristics of the building.

Key words*: ambient comfort, frequencies, vibrations.*

THE EFFECT OF URBANIZATION ON CLIMATE CHANGE, THE VULNERABILITY OF URBAN AREAS TO CLIMATE CHANGE AND THEIR CUMULATIVE IMPACT ON STORMWATER

Madalina ENE, Ioan BICA

Tehnical University of Civil Engineering of Bucharest,
122-124 Lacul Tei Blvd, District 2, Bucharest, Romania

Corresponding author email: madalina.ene@romair.ro

Abstract

Water is an essential factor for the existence and health of the population and a condition for the evolution of society. In the context of climate change, the sustainable use of water, the protection and improvement of the aquatic environment and the mitigation of the effects of floods and droughts both from the point of view of water quality and quantity are key factors of sustainable development. The spatial and temporal distribution of water is determined not only by economic activities and the degree of urbanization, but also by natural variations in climate because of climate change. In recent decades, there has been a growing awareness of the value of stormwater as a resource that must be considered in urban development. Implementing sustainable stormwater management involves measures at different scales, from urban and regional planning. Migration is an additional challenge for the urban development strategy. At the same time, water as a resource and related infrastructure are among the most vulnerable sectors during armed conflicts.

Key words*: stormwater, climate change, urbanisation, sustainable development.*

MODELING THE STRUCTURAL BEHAVIOR OF A CNC BEARING MEMBER SUBJECTED TO STATIC AND DYNAMIC LOADS

Nicoleta-Adaciza IONESCU[1], Daniela DOBRE[1, 2], Claudiu-Sorin DRAGOMIR[1, 3]

[1]National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development - URBAN-INCERC, 266 Pantelimon Road, District 2, Bucharest, Romania
[2]Technical University of Civil Engineering of Bucharest, 124 Lacul Tei Blvd, District 2, Bucharest, Romania
[3]University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Land Reclamation and Environmental Engineering, 59 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: adaionescu2002@yahoo.co.uk

Abstract

The paper aims within a multidisciplinary approach (Chemistry, Engineering, Finite element analysis) to highlight the structural behavior of a computer numerical control (CNC) resistance element from the vibrations point of view and following the deformations and efforts arising from static and dynamic loads. The modelling of the structural bearing member was done with the Finite Element Method, using three-dimensional elements of the Solid type, in specialized software, and considering different types of material (cast iron, reinforced concrete and reinforced concrete with the addition of polymer-coated clinker). Results concerning the variation of the dynamic characteristics (natural periods of vibration) and response spectra in accelerations, velocities and displacements in several points are presented. In conclusion, with regard to the considered materials, the use of concrete with intelligent addition to build the base of a CNC is a good solution. Using a smart reinforced concrete material embedded in the metal box gives greater rigidity to the structural system, the fundamental period having the lowest value, compared to the other two cases.

Key words*: concrete, self-repair, modelling, static and dynamic loads.*

TRANSFORMATION MODEL TOWARDS ENERGY POSITIVE PUBLIC BUILDING

Petar KISYOV

University of Food Technologies, 26 Maritza Blvd, Plovdiv, Bulgaria

Corresponding author email: petar.kisyov@yahoo.com

Abstract

Positive Energy Buildings and neighborhoods are having an important role in the clean energy transition and cities' green energy system transformation. The aim of this paper is to design and evaluate a scenario for the transformation of a single administrative public building located in Plovdiv, Bulgaria into Positive Energy Building. This is achieved through the implementation of set of passive and technological measures, including renewable power, so to decrease building`s demand and to fully electrify it and finally to cover buildings total energy demand by renewable mean. This work evaluates the efficiency, impact, investment costs and rate of return of a number of energy conservation measures being designed to be applied. Finally, techno-economic analysis and results are discussed and compared.

Key words*: building transformation models, positive energy buildings, renewable energy.*

CONCEPTUAL ANALYSIS ON DISASTER RESILIENCE IN THE CLIMATE VULNERABLE COMMUNITY CONTEXT

Aurelia NICA[1], Ira-Adeline SIMIONOV[1, 2], Alina ANTACHE[1, 2], Catalina ITICESCU[2, 3], Stefan-Mihai PETREA[1, 2], Catalin PLATON[4], Victor CRISTEA[5]

[1]"Dunarea de Jos" University of Galati, Food Science and Engineering Faculty, 111 Domneasca Street, Galati, Romania
[2]"Dunarea de Jos" University of Galati, REXDAN Research Infrastructure, 98 George Cosbuc Street, Galati, Romania
[3]"Dunarea de Jos" University of Galati, Faculty of Sciences and Environment, 111 Domneasca Street, Galati, Romania
[4]"ROMFISH" National Association of Fish Producers, 12A Nicolae Iorga Blvd, Iasi, Romania
[5]"Dunarea de Jos" University of Galati, Cross-Border Faculty, 47 Domneasca Street, Galati, Romania

Corresponding author email: stefan.petrea@ugal.ro

Abstract

Disaster resilience is the ability of individuals, communities, organizations, and systems to anticipate, prepare for, respond to, and recover from the impacts of hazards, such as natural disasters, extreme weather events, and other emergencies. It encompasses a broad range of factors and capacities that enable communities to withstand and bounce back from adverse events, minimizing their negative impacts and promoting long-term sustainability and well-being. Response efforts focus on the immediate actions taken during and immediately after a disaster to save lives, protect property, and meet the basic needs of affected populations. This includes deploying emergency services, providing medical care, search and rescue operations, and distributing aid to affected areas. Overall, disaster resilience is a dynamic and multidimensional concept that requires a comprehensive and integrated approach to address the complex challenges posed by natural hazards and climate change. By investing in resilience-building measures, communities can enhance their ability to withstand and recover from disasters, ultimately reducing human suffering, economic losses, and environmental degradation.

Key words*: adaptation, preparedness, prevention, response, recovery.*

THE CHALLENGES OF IMPLEMENTING THE GREEN-BLUE INFRASTRUCTURE IN THE METROPOLITAN AREAS OF THE BIG CITIES IN ROMANIA

Valentin TACHE, Adrian SIMION, Oana-Catalina POPESCU

National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development - URBAN-INCERC, 266 Pantelimon Road, District 2, Bucharest, Romania

Corresponding author email: tonytache62@gmail.com

Abstract

The fragmentation of green areas caused by urban development is inevitable, causing a decrease in biodiversity and a weakening of ecosystem services. A major challenge for urban planners is to ensure sustainable development, to integrate economic growth, social well-being and environmental conservation - through coherent development policies. The diversity of achievable solutions in connection with urban green-blue infrastructure takes into account temperature regulation and shading provided by vegetation, flood prevention and quality water supply, increasing air quality, reducing noise, maintaining biodiversity and creating areas of recreation. Nature-based solutions bring elements, characteristics and natural processes to cities and landscapes through effective interventions adapted at the local level. Nature-based solutions involve the intelligent use of nature`s resources – air, water, soil, increase natural capital and help economic growth. Such solutions can be implemented at the building level (green/blue roofs, green facades/walls) or at the public space level (urban green spaces, trees, community gardens, parks, urban agriculture, urban forests, green corridors, etc.). Strategic spatial planning has a key role in reshaping outdoor spaces to become resilient to climate change and extreme weather.

Key words*: ecosistem services, sustainable development, strategic urban planning, nature based solutions.*

WATER RESOURCES MANAGEMENT

TEMPORAL VARIATION AND RELATIONSHIP BETWEEN HYDROLOGICAL PARAMETERS AND WATER POLLUTANTS ON THE LOWER DANUBE, ROMANIA

Maxim ARSENI[1, 3], Valentina-Andreea CALMUC[3], Madalina CALMUC[3], Stefan-Mihai PETREA[2, 3], Adrian ROSU[1, 3], Eugen BUSILA[4], Catalina ITICESCU[1, 3], Puiu Lucian GEORGESCU[1, 3]

[1]"Dunarea de Jos" University of Galati, Faculty of Sciences and Environment, 111 Domneasca Street, Galati, Romania
[2]"Dunarea de Jos" University of Galati, Faculty of Food Science and Engineering, 111 Domneasca Street, Galati, Romania
[3]"Dunarea de Jos" University of Galati, REXDAN Research Infrastructure, 98 George Cosbuc Street Galati, Romania
[4]Trigen S.R.L., 36 Otelarilor Street, Galati, Romania

Corresponding author email: maxim.arseni@ugal.ro

Abstract

The interaction between hydrological parameters and aquatic quality parameters is important nowadays for integrated analysis of the status of an aquatic ecosystem. Discharge, flow speed, current direction, and water level represent some of the most important river parameters that can provide valuable information about the health and integrity of the ecosystem. At the same time, through an interdisciplinary approach that includes water pollution parameters, the status of the ecosystem can be analyzed in an integrated manner. A river's flow can influence how pollutants are transported and dispersed. The study carried out on the Lower Danube River part aims for an integrated analysis of these parameters, to establish the behaviour of water pollutants according to hydrological parameters. The results show an accumulation of high values of CCO and NH_4^+ in areas where the hydrological regime of the river is attenuated water flow decreases and where the banks are less steep. By integrating data on hydrological parameters with water quality results we can contribute to the development of effective environmental management strategies to protect and conserve natural resources.

Key words*: ADCP, pollutants dispersion, river discharge, sound velocity profiler, water quality.*

EVALUATION OF MICROBIAL AND CHEMICAL INDICATORS AS A MEASURE OF THE DEGREE OF POTABILITY OF WATER

Aurica Breica BOROZAN[1], Sorina POPESCU[1], Delia Gabriela DUMBRAVĂ[1], Diana-Nicoleta RABA[1], Mirela Viorica POPA[1], Corina Dana MIȘCĂ[1], Carmen Daniela PETCU[2], Despina Maria BORDEAN[1], Camelia MOLDOVAN[1]

[1]University of Life Sciences "King Mihai I" from Timisoara, 119 Calea Aradului, Timisoara, Romania
[2]University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Veterinary Medicine, 105 Splaiul Independentei, Bucharest, Romania

Corresponding author email: miscacorina@gmail.com

Abstract

Drinking water is a challenge for consumers and scientists in our century. The bacterial diseases and deaths recorded in recent years, as a result of the consumption of fecal-contaminated water, are reasons for concern and microbiological evaluation of water in all populated areas on Earth. In this paper, microbiological and chemical analyzes were performed for ten samples of water from wells drilled in households in the perimeter of Timis County, Romania. The analyzes included the range of microbial groups and species considered indicators of water quality. Their isolation and identification were carried out on specific nutrient media and were completed with determinations of nitrates and phosphates. According to the analysis reports, fecaligenous enterococci were not identified, instead clostridia were observed in most of the samples and a contamination with E. coli. The microbial load is high in the majority of samples. The chemical analyzes indicated the presence of phosphates and nitrates in most of the evaluated samples. The obtained results suggest the presence of some sources of fecal contamination and require taking measures to treat the waters in question.

Key words*: Clostridia, Escherichia coli, fecaligenous enterococci, fountain water, nitrates.*

PHYSIOLOGICAL AND BIOCHEMICAL RESPONSES OF TWO VARIETIES OF DURUM WHEAT UNDER WATER STRESS COMBINED WITH WASTE SLUDGE AMENDMENT

Sonia BOUDJABI[1], Haroun CHENCHOUNI[2], Aya DEBAB[1], Amna BRAHIMI[1], Asma METROUH[1]

[1]University of Tebessa, Faculty of Exact Sciences and Nature and Life Sciences, Department of Nature and Life Sciences, Tebessa, Algeria
[2]Higher National School of Forests, Department of Forest Management, Khenchela, Algeria

Corresponding author email: soniabeida@yahoo.fr

Abstract

The present experimentation studies the response of two varieties of Durum wheat (Triticum durum), variety to the application of sewage sludge under semi-arid climate. The test was carried out under greenhouse conditions in plastic pots. Four levels of water stress were applied (100%, 80%, 50% 30%) with four levels of sludge treatments (Control without sludge, 20 t/ha of sludge, 50 t/ha, 100 t/ha). The final level of treatment is a mineral fertilizer (urea) with a dose of 35 kg N/ha. Water stress affects negatively all the parameters, we detected with the level of water stress S4 a loss in water content; an accumulation in sugar (1.63 ± 0.29 µg/g MS) and proline (3.07 ± 1 µg/g MS); a loss in biomass and leaf area and grain yield (0.34 ± 0.33%), a decrease in chlorophyll and total nitrogen (1.95 ± 1.11%). The results also show that the application of sludge has reduced the effect of stress for all these variables. This effect also induced physiologically an accumulation of proline and sugar, which is very excessive especially with the third dose 100 t/ha of sewage sludge.

Key words*: biomass, chlorophyll, proline, sewage sludge, water deficit, yield.*

ASSESSMENT OF THE SURFACE WATER QUALITY DATA COLLECTED SEASONALLY AT THE DANUBE RIVER BIFURCATIONS (CEATAL IZMAIL AND CEATAL SF. GHEORGHE)

Irina CATIANIS, Adriana Maria CONSTANTINESCU, Dumitru GROSU, Gabriel IORDACHE, Florin DUȚU, Ana-Bianca PAVEL

National Institute for Research and Development on Marine Geology and GeoEcology (GeoEcoMar), 23-25 Dimitrie Onciul Street, Bucharest, Romania

Corresponding author email: irina.catianis@geoecomar.ro

Abstract

This study was carried out in the Danube Delta, at Ceatal Izmail and Ceatal Sfântu Gheorghe. The investigated sectors are of great importance, being essential key points related to the hydrological connectivity between the Danube River distributary branches and interdistributary channels, streams, and lakes of the Danube Delta. Thereby, six stations were selected to provide seasonal water quality data, collected biannually, from 2018 to 2023, in different hydrodynamic conditions (high and low waters). To assess the conditions of the investigated surface waters, several physical in-situ measurements (T, pH, DO, EC, TDS, Transp.) were taken at all sampling locations. Additionally, water samples were collected for laboratory analysis (N-NH_4^+, N-NO_2^-, N-NO_3^-, P-PO_4^{3-}, Chla, SiO_2, TOC, SO_4^{2-}, Turb., TSS, ORP). The criteria used to assess the water quality in the investigated sites include the current Romanian national legislation (Ord. 161/2006) and other international environmental standards. The majority of the investigated physical-chemical parameters were in line with correlated criteria, and only incidentally, the objectives were exceeded at single or multiple locations. According to this assessment, permanent monitoring of water quality is mandatory at these important hydrological nodes, by analyzing the status and trends in physical and chemical characteristics of the surface water environment.

Key words*: ecosystems, environment, physical-chemical parameters, seasonal, water quality.*

ESTIMATION OF RIVERBANK SOIL EROSION RATE: A CASE STUDY

Mihai Teopent CORCHEȘ

"1 Decembrie 1918" University of Alba Iulia, 5 Gabriel Bethlen Street, Alba Iulia, Romania

Corresponding author email: corchesmihai@yahoo.com

Abstract

Erosion of riverbanks is a natural phenomenon, which leads to the loss of important agricultural land areas. At the same time, riverbank erosion can be considered a natural risk that can cause major damage to road and railway infrastructure, flood management infrastructure, biodiversity and even the population located in flood risk areas. This phenomenon is generally more pronounced in the meanders of the rivers and in regions with higher flow rates, but it can be accentuated due to climate change which can lead to changes in watercourse flows. This study aimed to estimate the net annual soil loss due to riverbank erosion on the Siret River, Romania, using aerial photogrammetry and GIS analysis.

Key words*: climate change, riverbank erosion, soil erosion.*

PRINCIPAL COMPONENT ANALYSIS: AN APPROPRIATE TOOL FOR TROPHIC PARAMETERS INTERACTION - APPLICATION IN LARGEST LAKE IN BALKAN

Erdona DEMIRAJ, Irena DUKA, Ferdi BRAHUSHI, Seit SHALLARI

Agricultural University of Tirana, Department of Environment and Natural Resources, 1029 Pajsi Vodica Street, Tirana, Albania

Corresponding author email: edemiraj@ubt.edu.al

Abstract

The Lake of Shkodra is largest lake in the Balkans with Ramsar status, which offers a variety of important ecosystem services such as water sources for agriculture, rich biodiversity and providing habitat and nesting grounds for wildlife, and tourism development for Albania and Montenegro. During the latest decade, different studies reported an increase in macronutrient content, reporting the increase in the eutrophication in this lake which may reduce the biodiversity of the species. The aim of this study is the use the Principal Component Analysis (PCA) as a tool to define the relation of water quality parameters with the TN: TP ratio. According to PCA, the TN: TP molar observed ratio can be related to the anthropogenic activities and agricultural land use patterns around the catchment area indicating a high possibility of untreated waste entering the lake through the active inlets.

Key words*: PCA, Shkodra Lake, TN: TP ratio, TSI.*

ASSESSMENT OF PHYSICOCHEMICAL AND BACTERIOLOGICAL QUALITY OF WELL WATER USED FOR DRINKING AND DOMESTIC PURPOSES IN AN INDUSTRIAL AREA OF ELBASAN DISTRICT, ALBANIA

Ariola DEVOLLI[1], Edlira SHAHINASI[1], Enkeleida SALLAKU[2], Marilda OSMANI[3], Belinda HOXHA[3], Frederik DARA[4]

[1]Agricultural University of Tirana, Faculty of Biotechnology and Food, Department of Chemistry, Kodër Kamëz, 1025 Pajsi Vodica, Tirana, Albania
[2]Agricultural University of Tirana, Faculty of Agriculture and Environment, Department of Ecology and Natural Resources, Kodër Kamëz, 1025 Pajsi Vodica, Tirana, Albania
[3]"Aleksandër Xhuvani" University, Faculty of Natural Sciences, Department of Chemistry, Ismail Zyma, Elbasan, Albania.
[4]University of Tirana, Faculty of Natural Sciences, Department of Applied Mathematics, 4 Sheshi Nënë Tereza, Tirana, Albania

Corresponding author email: adevolli@ubt.edu.al

Abstract

Rapid population growth, urbanization, and unsustainable water management practices have all contributed to the depletion of freshwater resources. Groundwater is considered an important source for drinking and domestic purposes. In most cases, groundwater is threatened by physical, chemical, and microbiological contamination. The sources of groundwater contamination are numerous and have severe implications for public health. This study aims to assess the physicochemical and bacteriological quality of well water used for drinking and domestic purposes in the industrial area of the Elbasan district. Samples were collected from 57 wells and analysed for bacteriological (Total Coliforms and Escherichia coli) and physicochemical quality (pH, Electrical conductivity, total phosphorus, sulfate, ammonia, etc.) using standard methods. The collected data were subject to statistical analysis using the SPSS software ver.22. Physicochemical results revealed that 65% of wells did not meet WHO standards and Albanian guidelines set for drinking water. In terms of bacteriological analysis, 80 % of the samples were contaminated with total coliforms and 19 % with E. coli. Based on analysis of heavy metals some samples exceeded the limits of iron and lead content.

Key words*: bacteriological quality, groundwater, physicochemical quality, well water.*

USING HYDROGRAPHIC SURVEYS IN THE STUDY OF WATER BODIES DEPTHS

Levente DIMEN, Silvia Alexandra DREGHICI, Tudor BORȘAN

"1 Decembrie 1918" University of Alba Iulia, 5 Gabriel Bethlen, Alba Iulia, Romania

Corresponding author email: ldimen@uab.ro

Abstract

More than 70% of Earth's surface is covered by water bodies. The underwater relief is very diverse, from continental shelf to deepest trenches and is mostly insufficient known. Water bodies play an important role for our planet and human life, mainly because of helping to regulate the mass and energy transfer between Earth's layers, being source of food and supporting transportation. Due to the high importance of the water bodies, a better knowledge of the water bodies depths and protecting the underwater environment are vital. Though reaching the seabed for exploration could be difficult, modern technologies based on acoustic, optical or radio methods and bathymetric equipment allows hydrographic surveying in order to study the underwater relief. Therefore, strategies concerning climate change, reducing water pollution and environmental negative impact could be elaborated, ensuring sustainability.

Key words*: bathymetric equipment, depth, hydrographic survey, underwater body.*

ASSESSMENT OF THE SEDIMENT (DIS)CONNECTIVITY IN A DELTAIC SYSTEM, DANUBE DELTA, ROMANIA

Florin DUȚU, Bogdan-Adrian ISPAS, Irina CATIANIS, Ana-Bianca PAVEL, Laura DUȚU

National Institute for Research and Development on Marine Geology and GeoEcology (GeoEcoMar), 23-25 Dimitrie Onciul Street, Bucharest, Romania

Corresponding author email: florin.dutu@geoecomar.ro

Abstract

Delta systems, as final receptors of the fluvial systems are under considerable and increasing influence of multiple anthropogenic stresses, such as hydropower plant developments in the basins, extraction of groundwater in delta plains, embankment of banks, dredging of the navigation channel, the land use change, channel engineering, that affect the sediment connectivity. Along the Sulina Canal, the cut-off program and construction of the groins and dikes had important responses in grain size distribution between the main channel, the rectified meanders, and the lakes of the Danube Delta.
Two field campaigns (at high and low waters) were made in May and October 2023, focusing on the bed sediment composition and lithological constituents. Sediment samples were acquired throughout several cross-sections, to investigate the bed sediment characteristics. Grain size parameters (such as Median, Standard deviation, and Skewness) show the predominance of fine fraction (medium and fine sand, and silt), moderately and poorly sorted. The data were compared and larger modifications were found between the two analysed periods in the distribution of sediments.

Key words*: connectivity, Danube Delta, grain size, lithology, riverbed sediment.*

IMPACT OF PHYSICOCHEMICAL PARAMETERS ON ZOOPLANKTON AND BIOCOENOLOGICAL ANALYZES ON ZOOPLANKTON OF MANDRA RESERVOIR, IN SOUTHEASTERN BULGARIA

Eleonora FIKOVSKA, Dimitar KOZUHAROV

Sofia University "St. Kliment Ohridski", 8 Dragan Tzankov Blvd., Sofia, Bulgaria

Corresponding author email: e_fikovska@abv.bg

Abstract

The aim of this paper is to present some unpublished data from studies of zooplankton complexes in Mandra Reservoir during the period 2020-2021 at 7 research sites. It analyses whether physicochemical parameters pH, dissolved oxygen and conductivity significantly influence the occurrence of zooplankton in a reservoir. At the time of the investigation, 33 taxa of rotifers, 18 taxa of Cladocera, and 12 taxa of Copepoda were noted, and 4 taxa from Protozoa too. Canonical Correspondence Analysis (CCA) and biocoenological analyses were performed. In conclusion, we can say that in this shallow holopolymictic basin, no strong correlation was found between the grouping of zooplankton and the measured values for pH, dissolved oxygen and electrical conductivity. The dominant analysis reflects the dynamics in the dominant complexes of zooplankton in accordance with the conditions in the ecotonic zones between the Mandra Reservoir and the inflowing rivers.

Key words*: zooplankton, biocoenological analyzes, Mandra Reservoir.*

MODERN PROTECTION SOLUTIONS AGAINST COASTAL EROSION

Iulian IANCU, Alexandru DIMACHE, Oana-Stefania BUCUR, Daniel CORNEA

Technical University of Civil Engineering of Bucharest,
122-124 Lacul Tei Blvd, District 2, Bucharest, Romania

Corresponding author email: alexandru.dimache@utcb.ro

Abstract

Romania is one of the countries that experience the coastal erosion phenomenon, a natural process found along shorelines worldwide, caused by the action of waves and currents that entrain sediments. In the context of climate change, a significant intensification of coastal erosion has been observed in our country, especially due to increased wave heights resulting from severe storms. Reducing wave energy using traditional coastal protection structures is not always effective, besides being factually inefficient, is also extremely costly, both in terms of investment and maintenance. In recent years, modern technologies for wave energy dissipation have been developed, such as the use of floaters, submerged air cushions, and even the use of sound waves to attenuate the force of waves. The paper presents a solution to reduce wave energy using submerged mats, with direct benefits on reducing the erosive power of waves and ensuring coastal protection. The goal is to optimize the solution of submerged mats, ensuring maximum efficiency at minimum cost by adjusting the structural characteristics of the mat (length, thickness, elasticity, permeability) to the characteristics of the waves.

Key words*: coastal erosion, submerged mats, wave energy.*

ANALYSIS OF SOME PARAMETERS OF THE HYDROGRAPHIC BASINS IN THE FOREST FUND

Calin Ioan IOVAN[1], Nicu Cornel SABĂU[1], Lucian Sorin DOROG[1], Florin COVACI[1], Agneta Rodica IOVAN[2], Ghiță Cristian CRAINIC[1]

[1]University of Oradea, 1 Universitatii Street, Oradea, Romania
[2]Diosig Gymnasial School, 53 Orchards Street, Diosig, Romania

Corresponding author email: gccrainic@yahoo.com

Abstract

The forestry sector, due to its binary nature (biologically specific but also technical), must participate in solving some problems regarding the conservation and improvement of hydrological resources, the inventory and sustainable exploitation of all resources, the research of the structures and compositions of stands in hydrographic basins, in order to improve the hydrological functions of forests and soil protection. The paper presents a series of characteristics and parameters of the Aleu Valley watercourse and at the same time of the hydrographic and forest basin in which it is located. For this purpose, a series of determinations of water flows, parameters of the hydrographic basin (type of longitudinal profile of the course, shape, surface, maximum length and width, perimeter, shape index, average slope of the basin, length of the hydrographic network), as well as the analysis of the degree of total afforestation and partial areas in the Aleu Valley basin. The results of these analyzes may be of interest in order to capitalize on the potential of small watercourses in the forestry sector in the fisheries or energy fields.

Key words*: forest fund, hydrographic basin, parameters.*

IRRIGATION CHANGES IN THE MARITSA RIVER BASIN: A CASE STUDY FROM THE PLOVDIV REGION

Krasya KOLCHEVA

National Institute of Geophysics, Geodesy and Geography, Hydrology and Water Management Research Center, Bulgarian Academy of Sciences, Acad. Georgi Bonchev Street, Sofia, Bulgaria

Corresponding author email: kolchevakrasi@abv.bg

Abstract

In the context of the policy of securing and protecting water resources for growth and sustainable development, agriculture must, through adequate planning of land use, cultivated crops and water infrastructure and taking into account climate changes and the needs of ecosystems, have a responsible managing role. The changes in Bulgaria after 1989 have brought for agriculture many risks and challenges. Therefore, the present study aims at making a general overview of the state of irrigation in the region of Plovdiv, as an example of the Maritsa River watershed.in the period 2017-2021. On the basis of the obtained results, major problems and their possible solutions for agriculture and irrigation will be defined, such as recommendations for improving the agricultural policy and integrated water management in Bulgaria.

Key words: *irrigation system (IS), river water intake (RWI), water source.*

TOTAL REFLECTION X-RAY SPECTROMETRY (TXRF) FOR CHEMICAL ELEMENTS ASSESSMENT IN MUSSELS

Nina-Nicoleta LAZAR[1], Madalina CALMUC[1], Ira-Adeline SIMIONOV[1], Mihaela TIMOFTI[1], Puiu Lucian GEORGESCU[1], Catalina ITICESCU[1], Catalin PLATON[2]

[1]"Dunarea de Jos" University of Galati, 47 Domneasca Street, Galati, Romania
[2]"ROMFISH" National Association of Fish Producers, 12A Nicolae Iorga Blvd, Iasi, Romania

Corresponding author email: nina.condurache@ugal.ro

Abstract

Mussels are edible bivalve molluscs recognized as valuable sources of proteins, fatty acids, vitamins, and minerals. Their consumption is recommended for a balanced diet. This study aimed to assess the analytical capability of Total Reflection X-ray Fluorescence (TXRF) spectroscopy for determining the elemental composition of mussels (Mytilus chilensis and Mytilus galloprovincialis). Muscle samples were subjected to mineralization and subsequent analysis. The study successfully identified and quantified a range of trace elements, such as phosphorus (P), sulfur (S), potassium (K), calcium (Ca), chromium (Cr), manganese (Mn), iron (Fe), nickel (Ni), copper (Cu), zinc (Zn), arsenic (As), selenium (Se), bromine (Br), rubidium (Rb), strontium (Sr), and lead (Pb), utilizing gallium (Ga) as an internal standard. TXRF can be a valuable tool for accurately quantifying chemical elements even when detection thresholds are low.

Key words*: TXRF, mussels, Mytilus chilensis, chemical elements, Mytilus galloprovincialis.*

SUSTAINABLE MANAGEMENT OF WATER RESOURCES

Aurelia NICA[1], Stefan-Mihai PETREA[1, 2], Ira-Adeline SIMIONOV[1, 2], Alina ANTACHE[1, 2], Catalina ITICESCU[2, 3], Catalin PLATON[4], Victor CRISTEA[5]

[1]"Dunarea de Jos" University of Galati, Food Science and Engineering Faculty, 111 Domneasca Street, Galați, Romania
[2]"Dunarea de Jos" University of Galati, REXDAN Research Infrastructure, 98 George Cosbuc Street, Galati, Romania
[3]"Dunarea de Jos" University of Galati, Faculty of Sciences and Environment, 111 Domneasca Street, Galati, Romania
[4]"ROMFISH" National Association of Fish Producers, 12A Nicolae Iorga Blvd, Iasi, Romania
[5]"Dunarea de Jos" University of Galati, Cross-Border Faculty, 47 Domneasca Street, Galati, Romania

Corresponding author email: anica@ugal.ro

Abstract

The sustainable management of water resources involves the careful stewardship, conservation, and equitable distribution of water to meet current and future needs while preserving the integrity of ecosystems and ensuring social and economic development. Here are some key principles and strategies for sustainable water management: Integrated Water Resource Management, Water Conservation and Efficiency, Protecting Ecosystems, Climate Resilience, Water Governance and Institutions, Investment in Infrastructure and Technology and Cross-Sectoral Collaboration. Sustainable water management requires collaboration and coordination across sectors such as agriculture, energy, industry, and urban development, as water is interconnected with various aspects of socio-economic development. Integrated planning and decision-making processes can help balance competing water demands and identify synergies and trade-offs among different sectors. By adopting these principles and strategies, communities, governments, and organizations can work towards ensuring the sustainable management of water resources, safeguarding water security, supporting ecosystem health, and promoting equitable access to clean and reliable water for present and future generations.

Key words*: management, resources, sustainable, waters.*

DRIP IRRIGATION EFFICIENCY IN SOYBEAN CULTIVATION IN SOUTHEAST ROMANIA, A SUSTAINABLE APPROACH TO WATER MANAGEMENT

Oana Alina NIŢU[1], Ionuț Ovidiu JERCA[1], Mihaela BĂLAN[2]

[1]University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Land Reclamation and Environmental Engineering, 59 Marasti Blvd, District 1, Bucharest, Romania
[2]University of Craiova, Faculty of Agronomy, 19 Libertatii Street, Craiova, Romania

Corresponding author email: oanaalinanitu1111@gmail.com

Abstract

Cultivating soybeans holds significant importance in ensuring food security and economic stability. In the context of climate challenges and limited resources, efficient water resource management becomes crucial. This article explores the sustainable approach of drip irrigation in soybean cultivation, specifically in Southeast Romania. Drip irrigation proves effective in Southeast Romania by delivering water directly to the soybean roots, minimizing losses from evaporation and runoff. This contributes to the conservation of water resources in the region. The precise water distribution of drip irrigation ensures uniformity in water supply, preventing both over-irrigation and under-irrigation, with significant benefits for soybean crops in Southeast Romania. Drip irrigation systems are tailored to the soil types and climate conditions present in Southeast Romania, ensuring optimal water usage efficiency. Given the variable weather patterns in the region, the ability of drip irrigation to adapt and respond to changes in climate contributes to the resilience of soybean crops. Through the use of advanced technology and local expertise, customized drip irrigation configurations are implemented to suit the specific needs of soybean cultivation in Southeast Romania.

Key words: *advanced technology, crop efficiency, uniform water distribution.*

BIODIVERSITY AND ECOLOGICAL ASSESSMENT OF THE CHEPELARSKA RIVER, BULGARIA

Georgi PATRONOV[1], Diana KIRIN[2, 3]

[1]University of Plovdiv "Paissii Hilendarski", Department of Chemical Technology, 24 Tsar Assen Street, Plovdiv, Bulgaria
[2]Agricultural University - Plovdiv, Department of Agroecology and Environmental Protection, 12 Mendeleev Blvd, Plovdiv, Bulgaria
[3]National Institute of Geophysics, Geodesy and Geography, Hydrology and Water Management Research Centre, Bulgarian Academy of Sciences, Acad. Georgi Bonchev Street, Sofia, Bulgaria

Corresponding author email: gipatronov@abv.bg

Abstract

The results of research on biological diversity in a section of the Chepelarska River and the territories adjacent to it, subjected to anthropogenic pressure, are presented. The studied area (water body code BG3MA500R103, river type R5Semi-mountainous type in Ecoregion 7 Eastern Balkans) falls entirely within protected area BG0000194 "Chaya River". It is located along the lower section of the river before it flows into the Maritsa River (Eastern White Sea Basin). The types of natural habitats and their ecological status are presented. Regarding the registered 45 species of higher plants and 22 animal species, the nature protection status and the species with resource importance have been determined. The results from the ecological monitoring of the freshwater ecosystem based on physicochemical elements (dissolved O_2, pH, electrical conductivity, Ptotal, N-NH_4, N-NO_2, N-NO_3, P-orthoPO_4, Zn, Cu, Pb, Cd) and ecological quality element macrozoobenthos, after applying the established standards are discussed. Measures to improve the ecological condition of the studied area are indicated.

Key words*: chemical state, ecological condition, ecological indices, protected habitats, protected species.*

VARIATIONS OF PHYSICO-CHEMICAL PARAMETERS IN SULINA BRANCH AND ADJACENT MEANDERS DURING TWO SEASONS IN 2023

Ana Bianca PAVEL, Florin DUTU, Gabriel IORDACHE, Catalina GAVRILA, Irina CATIANIS, Laura DUTU

National Institute for Research and Development on Marine Geology and GeoEcology (GeoEcoMar), 23-25 Dimitrie Onciul Street, Bucharest, Romania

Corresponding author email: laura.dutu@geoecomar.ro

Abstract

The Sulina Branch, situated in the Delta`s midpoint, features a distinct straight course requiring continuous dredging for maritime navigation. Stretching 71 km, it conveys 18% of the Romanian lower sector of Danube`s water and historically served as a pivotal fluvial transport route, despite navigational challenges posed by sinuosities. It underwent a significant transformation that shortened it by 21.2 km (25.30%), converting it into a nearly straight navigable canal. This led to adverse effects like benthic habitat destruction, increased turbidity, and altered flooding patterns, impacting local ichthyofauna and avifauna. Navigation along the now straight Sulina Branch faced disruptions from sediment shoals at the mouth, due to the synergistic action of fluvial and coastal currents. In spring and autumn 2023, we measured physico-chemical parameters at 30 stations along Sulina Branch and adjacent Meanders, correlating them with bathymetry, water flow, and currents. Clear distinctions were observed, especially between upstream and downstream locations. Oxygen measurements both in spring and autumn, indicated good status water quality. Results demonstrated a good status in water quality at most stations during the study period.

Key words*: meanders, physico-chemical parameters, Sulina branch, water quality.*

ENABLING SOFT SENSORS FOR WATER QUALITY MONITORING IN MULTI-TROPHIC AQUACULTURE SYSTEMS

Stefan-Mihai PETREA[1, 2, 4], Ira-Adeline SIMIONOV[1, 2, 5], Alina ANTACHE[1, 2, 6], Aurelia NICA[1], Madalina CALMUC[2, 3], Valentina CALMUC[2, 3], Dragos CRISTEA[4], Catalin PLATON[7], Puiu Lucian GEORGESCU[2, 3]

[1]"Dunarea de Jos" University of Galati, Food Science and Engineering Faculty, 111 Domneasca Street, Galati, Romania
[2]"Dunarea de Jos" University of Galati, REXDAN Research Infrastructure, 98 George Cosbuc Street, Galati, Romania
[3]"Dunărea de Jos" University of Galati, Faculty of Sciences and Environment, 111 Domneasca Street, Galati, Romania
[4]"Dunărea de Jos" University of Galati, Faculty of Economics and Business Administration, 59-61 Nicolae Balcescu Street, Galati, Romania
[5]"Dunărea de Jos" University of Galati, Faculty of Automatic Control, Computers, Electrical Engineering and Electronics, 2 Stiintei Street, Galati, Romania
[6]"Alexandru Ioan Cuza" University of Iasi, 11 Carol I Blvd, Iasi, Romania
[7]"ROMFISH" National Association of Fish Producers, 12A Nicolae Iorga Blvd, Iasi, Romania

Corresponding author email: stefan.petrea@ugal.ro

Abstract

The paper aims to use machine-learning-based algorithms in order to enable and empower the integration of soft sensors for improving the economic sustainability of integrated multi-trophic recirculating aquaculture systems (IMRAS) through efficient and accurate water quality monitoring of nitrate-nitrogen (N-NO_3), the main key parameter for maintaining the sustainability of the IMRAS in various production scenarios. A 30-day trial was conducted in a sturgeon–tarragon IMRAS to develop an N-NO_3 soft sensor, based on a series of predictors such as pH, temperature, N-NH_4, N-NO_2, N-NO_3, conductivity (EC), P_2O_5, Ca and Mg, as well as to identify the prediction model peculiarities in various exploitation scenarios generated by the crops culture density. The results reveal the effectiveness of different learning algorithms as MLR and XGBoost (>80% accuracy) in developing solutions for supporting the water quality monitoring process in IMRASs, concluding that the intensity of production technologies must be considered as a determinant factor in upscaling the solutions to industrial level.

Key words*: machine-learning, multi-trophic aquaculture, nitrate-nitrogen, soft sensor, water quality.*

VIRTUAL SENSOR FOR AMMONIA ESTIMATION IN AQUACULTURE TECHNOLOGICAL WATER FROM CAMBODIA

Ira-Adeline SIMIONOV[1, 2], Lin KONG[3, 4], Samnang PEL[3, 4], Catalin PLANTON[5], Domenico CARUSO[6], Jacques SLEMBROUCK[6], Stefan-Mihai PETREA[1, 2]

[1]"Dunarea de Jos" University of Galati, Food Science and Engineering Faculty, 111 Domneasca Street, Galati, Romania
[2]"Dunarea de Jos" University of Galati, REXDAN Research Infrastructure, 98 George Cosbuc Street, Galati, Romania
[3]Royal University of Agriculture, Dongkor District, Phnom Pehn, Cambodia
[4]Ministry of Agriculture, Forestry and Fisheries, Fisheries Administration, Department of Aquaculture Development, Phnom Penh, Cambodia
[5]"ROMFISH" National Association of Fish Producers, 12A Nicolae Iorga Blvd, Iasi, Romania
[6]University De Montpellier, 163 rue Auguste Broussonnet, Montpellier, France

Corresponding author email: ira.simionov@ugal.ro

Abstract

In Cambodia, the aquaculture sector registers one of the fastest growths among all the food sectors, with a mean annual growth of more than 18% obtained between 2002 and 2020. The main challenge associated with the intensification of aquaculture is the discharge of untreated effluents, which contain large amounts of organic matter, nutrients, minerals, and other chemicals. Among these, ammonia (NH_3) is of the highest interest to monitor and measure in the technological water since it directly influences the survival and growth performance of the fish biomass. At the same time, the discharge of aquaculture wastewaters, containing high concentrations of ammonia, can generate water eutrophication in the natural aquatic environments receiving the effluents. The present study aimed to develop a virtual sensor capable of estimating the concentration of NH_3 in the technological water of a typical earthen aquaculture pond from Phnom Penh - Cambodia. Multiple decision tree algorithms were employed for the prediction analysis and the accuracy was established based on RMSE (root mean square error) and R squared values.

Key words*: ammonia, aquaculture, Cambodia, soft sensor.*

ASPECTS RELATED TO THE ESTIMATION OF THE FLOOD LIMITS WITH THE USE OF A UAV IN ORDER TO HYDRAULICALLY DESIGN THE WATER MANAGEMENT WORKS

Alexandru SÎNTU-LĂSAT[1, 2]

[1]University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd, District 1, Bucharest, Romania
[2]National Administration "Romanian Waters", 11 Ion Campineanu Street, District 1, Bucharest, Romania

Corresponding author email: alex.lasat@gmail.com

Abstract

The present paper aims to highlight a more efficient and safer way to estimate the flood limits especially in hard-to-reach areas (hill-mountain) in order to reduce the calamities caused by flashfloods through water management works. It was used an UAV (drone) with D-RTK technology together with a GPS station with which there were captured elevation points on the ground. The study area is located in Alba County on the Răchita Valley near the Sebeș city, area having a strong torrential character, especially during short-term and high-intensity rains. In 2019-2020 a flood of 106 m^3/s was recorded, representing a huge value compared to the multiannual flow of the main water course of 8.88 m^3/s. The estimation of the limits is fully computerized, obtaining the most accurate results to be able to design hydraulic specifications for hydrotechnical schemes and structures needed considering both structural and environmental sides.

Key words*: UAV, flashflood, D-RTK, flood limit, hydraulic works.*

THE INFLUENCE OF THE LAKE HYPOLYMNON DISCHARGE ON THE PHYSICO-CHEMICAL PARAMETERS OF THE RIVER

Lavinia TATARU, Florian STĂTESCU, Nicolae MARCOIE

"Gheorghe Asachi" Technical University of Iasi,
67 Dimitrie Mangeron Blvd, Iasi, Romania

Corresponding author email: lavinia.tataru@student.tuiasi.ro

Abstract

The analysis of the evolution of water quality parameters over time is of interest to researchers and authorities because it provides information on long-term changes in the river basin and allows the evaluation of the effectiveness of pollution control measures in the context of national and international commitments. This study describes eutrophication as a process of degradation of Lake Kortowskie, Poland, summarizes the effects of lake hypolimnion discharge on the water quality of the Kortówka River, and presents, in tabular form, the statistical principles specific to factor analysis (ANOVA). Water quality was assessed by comparing temperature, pH, changes in oxygen concentration (DO), conductivity (EC) and redox potential (ORP) before the experiment, during and after the experiment.

Key words*: eutrophication, nutrients, restoration techniques, statistical analysis, water quality.*

SUSTAINABLE APPROACH OF NUTRIENT FILM TECHNOLOGY BASED ON EFFICIENT WATER AND ENERGY USE - INTERMEDIATE RESULTS

Augustina TRONAC, Dragoș DRĂCEA, Sebastian MUSTAȚĂ, Oana Alina NIȚU

University of Agronomic Sciences and Veterinary Medicine of Bucharest,
Faculty of Land Reclamation and Environmental Engineering,
59 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: augustina.tronac@yahoo.com

Abstract

The paper approach the greenhouse plant yield analyzing water and energy resources embedded in product when Nutrient Film Technology (NFT) is applied. Examining the process, identifying the phases, the intervening components, calibrating the model, it is possible, as intermediate results, to determine for each growth element the water and energy consumption, in order to offer solutions for reducing water, nutrients, electricity content, diminishing production costs and being environmentally friendly. The consequences are important for functional engineering of plant growth as well as for technological developments to make natural resources more efficient in a sustainable manner. The research will continue and will try to define the moment in the evolution of the culture in which harvesting is optimal from the point of view of the included resources, the resulting nutritional value, the minimum impact on the environment.

Key words*: nutrient film technology (NFT), greenhouse plant yield, water and energy use, efficiency, sustainability.*

ADVANCE HYDRAULIC MODELLING FOR IRRIGATION SYSTEMS: CASE STUDY SPP15 IRRIGATION PLOT HOTARANI - ROMANIA

Daniela-Cristina UNTARU, Teodor-Eugen MAN, Robert BEILICCI, Mircea VISESCU, Erika BEILICCI, Antonia-Mariana PASC

Politehnica University of Timisoara, 1A Splaiul Spiru Haret, Timisoara, Romania

Corresponding author email: mircea.visescu@upt.ro

Abstract

The numerical models commonly used for pressurized water distribution networks can also be adapted for modeling underground irrigation networks, which has also been done in this paper. Software packages such as Epanet, Mike Urban, etc. are usually designed for drinking water supply applications thus requiring adaptation of boundary conditions specific to underground irrigation networks. In this case study the hydraulic modelling of the irrigation network was done with the advanced Mike Urban software package. Following the modelling, the sizing of the newly designed pipeline network, the diagrams of pressures, speeds, flows, as well as the evolution in time in various operating scenarios were performed. The investment of the modernization and rehabilitation of OUAI Hotarani was financed currently through the 2023 - 2027 Strategic Program, intervention DR-25. In our paper we present the current nonfunctional and proposed rehabilitated functional situation of the SPP15 Hotarani irrigation system. Modernization *by using new/modern mobile irrigation by sprinkling equipment ensures the operation at superior technical parameters, water, and energy saving.*

Key words*: head loss, hydraulic modelling, irrigation sprinkler system, pressure diagram, rehabilitation.*

DROUGHT MONITORING IN SOUTHEASTERN ROMANIA BASED ON THE COMPARISON AND CORRELATION OF SPEI AND SPI INDICES

Sara VENTURI[1], Elena MATEESCU[2], Ana VIRSTA[3], Nicolae PETRESCU[4], Daniel DUNEA[4], Stefano CASADEI[1]

[1]Università degli Studi di Perugia, 93 Via Duranti, Perugia, Italy
[2]National Administration of Meteorology, 97 Bucuresti-Ploiesti Road, Bucharest, Romania
[3]University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd, District 1, Bucharest, Romania
[4]Valahia University of Targoviste, 13 Sinaia Alley, Targoviste, Romania

Corresponding author email: dan.dunea@valahia.ro

Abstract

The main aim was to assess the drought phenomena by comparing two relevant indicators i.e., the standardized precipitation index (SPI) and the standardized precipitation evaporation index (SPEI) using long time series of precipitation and temperature starting from 1961 up to 2020 gauged and validated in the land monitoring system of the Ialomita district located in the southeast of Romania at Grivita station. The obtained results suggested that SPEI can provide better insights regarding the drought phenomena concerning the occurrence of drought events and trend estimation. In the next years, drought events are expected to rise in frequency, duration, and intensity. In our opinion, it would be necessary to exceed the prevailing use of the SPI to assess the drought phenomena and improve the environmental monitoring systems to have robust data both of rainfall and temperature in a high number of gauging stations that could be utilized also for a spatially distributed evaluation of SPEI index.

Key words*: climate trend, drought indices, Grivita meteorological station, Ialomita district, SPEI-SPI correlation.*

RESEARCH TRENDS IN USING WATER RESOURCES IN CENTRAL AND EASTERN EUROPE. A CORPUS-BASED ANALYSIS

Alina-Cerasela ALUCULESEI, Nicoleta GUDANESCU, Sorin IONITESCU, George Cornel DUMITRESCU, Simona MOAGAR-POLADIAN

Romanian Academy, Institute for World Economy,
13 Calea 13 Septembrie, Bucharest, Romania

Corresponding author email: aluculesei.alina.cerasela@gmail.com

Abstract

Water resources are highly valuable globally, and their sustainable use has become a top priority for authorities. Central and Eastern European (CEE) countries have a long history of using water in various activities, leading to extensive exploitation of these resources. The increasing demand underscores the need for comprehensive management at both national and regional levels. This study examines research trends on water resource exploitation in CEE countries to pinpoint potential gaps that academia can address to provide essential insights for policymakers. Through a bibliometric analysis of 403 articles and proceedings using the Web of Science database and VosViewer software, significant research interest was revealed in water management, wastewater reuse solutions and sustainable agricultural water use. However, the analysis also highlighted a lack of focus on new labor market requirements corresponding to emerging water management technologies. These findings suggest a need for future research to address this gap and provide actionable insights for adapting educational and training programs to meet the evolving demands of the water management sector.

Key words*: water resources management, sustainable water use, wastewater reuse, Central and Eastern Europe (CEE), bibliometric analysis, VosViewer software, water management policies, research trends in water resource exploitation.*

POLLUTION CONTROL, LAND PLANNING

PHYTOREMEDIATION OF CHROMIUM BY BAD BIRNBACH ROSES IN URBAN AREAS

Aysen AKAY

University of Selcuk, Agriculture Faculty,
Department of Soil Science and Plant Nutrition, Konya, Türkiye

Corresponding author email: aakay@selcuk.edu.tr

Abstract

Chromium is a heavy metal that is toxic to plants and other living things. It is known that plants can be used to remove heavy metals from the environment if they accumulate in the soil. Various ornamental plants are used in urban areas due to their decorative properties. In this study, the effectiveness of the Bad-Birnbach rose variety in removing excess chromium in the soil was investigated. To determine its effect on the vegetative and generative development states of roses and Cr uptake from the soil, different doses of Cr^{+6} (0, 25, 50 mg/kg soil) and 0-5-10-20 mmol EDTA were applied to the plant growth medium. At the end of the experiment, the dry weight of the stem and root decreased significantly with the applications of Cr^{+6}. With EDTA application, the dry weight of roots and flowers increased. Cr concentrations in stem, root and rose are between 3.63-55.04, 14.53 - 314.77 and 2.31 - 13.44 mg/kg, respectively. Cr concentrations in the plant are above the permissible limit values and Cr^{+6} has accumulated significantly in the root zone.

Key words*: chromium, EDTA, heavy metal, ornamental plants, phytoremediation.*

SILPHIUM PERFOLIATUM A PROMISING ENERGY CROP FOR PHYTOREMEDIATION OF HEAVY METAL CONTAMINATED SOILS

Violina ANGELOVA

Agricultural University - Plovdiv, 12 Mendeleev Blvd, Plovdiv, Bulgaria

Corresponding author email: vileriz@abv.bg

Abstract

Comparative studies have been carried out to determine the quantities and depositions of heavy metals, macro-, and microelements in the vegetative organs of Silphium perfoliatum, the efficiency for phytoremediation and the quality of the biomass as a renewable energy source for the combustion process. The field experiment was conducted on an agricultural field contaminated by the Non Ferrous Metals Plant near Plovdiv, Bulgaria. Silphium perfoliatum is tolerant to heavy metals and can be grown on highly contaminated soils (1671.6 mg/kg Zn, 1694.8 mg/kg Pb, and 54.8 mg/kg Cd). The high concentration of heavy metals in the roots and the low translocation coefficient indicate the possibility of using Silphium perfoliatum for phytostabilization. The results have shown that Silphium perfoliatum can be a significant source of good-quality raw material in producing solid biofuels. The content of heavy metals in the biomass of Silphium perfoliatum grown on contaminated soils does not exceed the limit values according to the standard ISO 17225-6:2014. Biomass of Silphium perfoliatum from highly contaminated soils could be used as a source of energy.

Key words*: cup plant, polluted soils, proximate and elemental analysis, combustion.*

ACCUMULATION OF HEAVY METALS IN *DACTYLIS GLOMERATA* L. PLANTS IN CORRELATION WITH SOIL IN PERMANENT MEADOWS IN THE COPȘA MICĂ AREA OF ROMANIA

Vera CARABULEA[1], Dumitru-Marian MOTELICĂ[1], Nicoleta Olimpia VRÎNCEANU[1], Georgiana PLOPEANU[1], Bogdan Ștefan OPREA[1], Mihaela COSTEA[1], Vasilica LUCHIAN[2]

[1]National Research and Development Institute for Soil Science, Agrochemistry and Environment - ICPA Bucharest, 61 Marasti Blvd, District 1, Bucharest, Romania
[2]University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: oprea.bogdan95@yahoo.com

Abstract

This study aims to estimate the accumulation of heavy metals (Cd, Pb, Zn and Cu) from soil in Dactylis glomerata L. plants from permanent meadows in the polluted area of Copșa Mică, Romania. The estimation of heavy metal accumulation in Dactylis glomerata L. plants was carried out based on a data set collected from permanent meadows used for grazing and hay production. The logarithmic power-type regression plots estimating the stochastic dependence between the total cadmium content in the aerial part of Dactylis glomerata L. plants and soil is statistically significant, and for Cu, Pb and Zn they are less significant. The variation of the total metal content (Cd, Cu, Pb and Zn) determined in the soil samples in the 0–20 cm layer according to the distance from the pollution source is statistically significant. The results of this study are important for the estimation of heavy metal (Cd, Cu, Pb and Zn) accumulation in Dactylis glomerata L. plants from permanent grasslands, which are consumed by animals.

Key words*: heavy metals, pollution, soil, Dactylis glomerata L.*

GREEN-SYNTHESIZED ZnO NPs AS SUSTAINABLE PHOTOCATALYSTS FOR THE DEGRADATION OF ACETAMINOPHEN

Alexandra Corina COSTANDACHE[1], Leon Dumitru COVALIU[1], Anca Andreea ȘĂULEAN[1], Cristina Ileana COVALIU-MIERLA[1], Ecaterina MATEI[1], Razvan TEODORESCU[2], Valerica TUDOR[2]

[1]National University of Science and Technology POLITEHNICA Bucharest, 313 Splaiul Independentei, District 6, Bucharest, Romania
[2]University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: leon.covaliu@yahoo.com

Abstract

Water contamination is a growing concern with profound implications for public health and ecosystems. The advent of nanotechnology has expanded the utility of nanoparticles (NPs) in diverse fields. These biogenic ZnO nanostructures offer an eco-friendly alternative for photocatalysis. The research aims to (i) employ a green synthesis method for ZnO nanostructure production using a grapefruit extract, (ii) thoroughly characterize these nanostructures using optical microscopy (OM), X-ray diffraction (XRD), Zeta potential and pHpzc, and (iii) evaluate the photocatalytic efficiency in degrading acetaminophen from water solutions. The findings display a sustainable approach to water purification, addressing the challenges of water contamination and emerging pollutants by utilizing green-synthesized ZnO nanoparticles.

Key words*: acetaminophen, green synthesis, photodegradation, zinc oxide.*

ECOLOGICAL TREATMENT OF WASTEWATER CONTAINING A CATIONIC SURFACTANT POLLUTANT

Leon Dumitru COVALIU[1], Iuliana PAUN[1, 2], Vasile Ion IANCU[2], Ecaterina MATEI[1], Razvan TEODORESCU[3], Valerica TUDOR[3], Gigel PARASCHIV[1], Cristina Ileana COVALIU-MIERLA[1]

[1]National University of Science and Technology POLITEHNICA Bucharest, Faculty of Biotechnical Systems Engineering, 313 Splaiul Independentei, District 6, Bucharest, Romania
[2]National Research and Development Institute for Industrial Ecology - ECOIND, 71-73 Drumul Podu Dambovitei Street, District 6, Bucharest, Romania
[3]University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Land Reclamation and Environmental Engineering, 59 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: cristina_covaliu@yahoo.com

Abstract

Increasing pollution from organic substances that are difficult to biodegrade has led scientists to search for solutions to prevent them from entering the environment. A type of pollutant widely found in environment is quaternary ammonium compounds, with benzalkonium chlorides being the main representative. Among benzalkonium chlorides class, was chose to study the method of removal benzyldimethyldodecylammonium chloride (C12-BAC) from wastewater. One efficient method for the removal of organic compounds from wastewater is by using adsorbent material. For this reason, this paper presents the treatment of wastewater containing benzyldimethyldodecylammonium chloride (C12-BAC) by activated carbon material.

Key words*: activated carbon powder, benzalkonium chloride, quaternary ammonium salt, wastewater treatment.*

ENVIRONMENT CONTAMINATION WITH PETROLEUM HYDROCARBONS

Cristian Mugurel IORGA[1], Puiu Lucian GEORGESCU[1], Mihaela Marilena STANCU[2]

[1]"Dunarea de Jos" University of Galati, Faculty of Sciences and Environment, European Centre of Excellence for the Environment, 111 Domneasca Street, Galati, Romania
[2] Institute of Biology Bucharest of Romanian Academy, 296 Splaiul Independentei, Bucharest, Romania

Corresponding authors emails: cristian.iorga@ugal.ro, mihaela.stancu@ibiol.ro

Abstract

Important quantities of petroleum hydrocarbons are frequently spilled into the environment harming the environment, as well as human health. Furthermore, the interaction of petroleum hydrocarbons with the environment significantly disturbs the activity of the microorganisms, including bacteria that exist in petroleum hydrocarbons polluted environments. Using two different microbiological methods four groups of bacteria, such as heterotrophic, hydrocarbon-tolerant, hydrocarbon-degrading, as well as enterobacteria were detected in the analyzed samples collected from an old petroleum products storage. The detection of these bacteria, especially hydrocarbon-degrading, as well as hydrocarbon-tolerant bacteria was not unexpected since the concentration of the petroleum hydrocarbons in the analyzed samples was above the limit allowed by international environmental standards. Up to now, different treatment technologies have been developed to remove toxic hydrocarbons from environments contaminated with petroleum products. Therefore, because of the use of different remediation strategies, like bioremediations, the affected areas can be recovered and returned to their natural circuit.

Key words: *bacteria, bioremediation, contamination, environment, petroleum hydrocarbon.*

SOIL AND SLUDGE SAMPLES CHEMICAL PROPERTIES AND VEGETATION MINERAL COMPOSITION MONITORIZATION ON THE IAȘI SEWAGE TREATMENT-PLANT PONDS PRECINCT (TOMEȘTI)

Mihaela LUNGU, Radu LĂCĂTUȘU, Andrei VRÎNCEANU, Rodica LAZĂR, Ilie CALCIU

National Research and Development Institute for Soil Science, Agrochemistry and Environment - ICPA Bucharest, 61 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: mihaelalungu.icpa@gmail.com

Abstract

Sludge quality resulted from the Iași sewage treatment-plant and deposited in the Tomești ponds has been studied over several years, starting 2005, with the aim of land greening. The main general chemical properties of the sewage treatment sludge in process of soil formation showed that it offers normal conditions for vegetation development even though upper horizons salinization was detected that year due to drought occurrence. Zinc contents were very high in the upper horizons. The sampled plants accumulated normal macro elements quantities and only zinc out of the heavy metals in higher concentrations, especially in the roots, without prejudice to vegetation development. As compared to this situation the Tomești sewage treatment pond had reached an incipient soil formation stage in 2020 following several greening measures and the draining phenomenon which had a certain intensity and determined vegetal cover changes, from a mainly hygrophytic vegetation to a less humidity loving one.

Key words*: sewage treatment sludge, soil quality, macro elements, salinization, heavy metals.*

SOIL HEAVY METALS CONTENT VARIATION DEPENDING ON THE DISTANCE FROM POLLUTION SOURCE AND UPTAKE BY THE *TRIFOLIUM PRATENSE* L. SPECIES HARVESTED FROM COPȘA MICĂ AREA, CENTRAL ROMANIA

Bogdan Ștefan OPREA, Nicoleta Olimpia VRÎNCEANU, Vera CARABULEA, Dumitru-Marian MOTELICĂ, Mihaela COSTEA, Georgiana Iuliana PLOPEANU

National Research and Development Institute for Soil Science, Agrochemistry and Environment - ICPA Bucharest, 61 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: carabulea_vera@yahoo.com

Abstract

Heavy metals pollution has always been a significant problem for human, animal, and plant health. Copșa Mică, Romania, stands out as one of the most polluted areas with heavy metals, mainly due to emissions from two factories (Carbosin and Sometra), which have been operating in the past for about 60 years. In 2023, soil and plant (Trifolium pratense L.) samples were collected from the polluted meadows in the researched area to analyze and determine cadmium, lead, zinc, and copper concentrations. Cd recorded the lowest concentration in both soil and plant samples with values of 5.17 mg·kg^{-1}dry weight (d.w.) and 0.52 mg·kg^{-1}d.w., respectively. The highest content in both soil and plant samples was recorded by Zn, with values of 334.5 mg·kg^{-1}d.w. (soil) and 69.67 mg·kg^{-1}d.w. (plant). Soil heavy metals content variation depending on the distance from the pollution source showed significant values only for Cd and Zn, while the values for Pb and Cu were insignificant. The results obtained from this study will be used to raise awareness of the population living in the affected areas on the risks that arise from using the meadows for grazing and harvesting hay.

Key words*: accumulation, heavy metals, meadow, pollution, Trifolium pratense L.*

WASTE CLASSIFICATION USING VISION TRANSFORMERS

Dan-Constantin PUCHIANU

Valahia University of Targoviste, 13 Sinaia Alley, Targoviste, Romania

Corresponding author email: pdantgv@yahoo.com

Abstract

Effective identification of recyclable waste is a major challenge in resource management and environmental protection. The present study explores the integration of transformer-based architectures for the accurate classification of recyclable waste, including plastic, glass, metal, and paper. A dataset consisting of digital images of different types of waste was used to train and evaluate the proposed architectures. To improve the generalization of the model a division of the dataset was pursued for the training, validation, and testing areas, as well as the implementation of data augmentation and transfer-learning techniques. Compared to traditional methods and different convolutional neural network architectures, transformer-based architectures have demonstrated superior performance both in terms of accuracy and computational efficiency. Analyzing the experimental results, the proposed models demonstrated accuracy values of over 95%. The study notes that the use of transformer-based architectures for the classification of waste from digital images presents a major potential in the development of efficient waste management practices and for reducing the impact of waste on the environment.

Key words*: deep-learning, image classification, sustainability, vision transformers, waste management.*

IMPACT ASSESSMENT REGARDING POLLUTION WITH NUTRIENTSOF WATER RESOURCES DUE TO THE USE OF FERTILIZERS WITH MICROBIAL BIOMASS

Nicoleta RADU[1], Iuliana RAUT[2], Mariana CONSTANTIN[2], Mihaela BEGEA[3], Anca Daniela RAICIU[4]

[1]University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd, District 1, Bucharest, Romania
[2]National Institute for Research & Development in Chemistry and Petrochemistry - ICECHIM Bucharest, 202 Splaiul Independentei, Bucharest, Romania
[3]National University of Sciences and Tehcnology POLITEHNICA Bucharest, 313 Splaiul Independentei, Bucharest, Romania
[4]Titu Maiorescu University, 187 Calea Vacaresti, Bucharest, Romania

Corresponding author emails: ela_begea@yahoo.com, nicoleta.radu@biotehnologii.usamv, rodaniela_raiciu@yahoo.com

Abstract

A way of valorization of solid sub-products from pharma is biofertilizer manufacturing. This pathway can become attractive because the new products have two properties: fertilization and soil precursors for humic and fulvic compounds. The main aim of this paper was to assess the impact generated on water resources by the new fertilizers. The impact on surface waters was determined by levigation tests performed in the lab with fertilizers formulated with two types of microbial biomass. The results obtained from levigation tests showed that in the case of main macroelements, the fertilizers formulated with microbial biomass lose between 77.9 and 85.11% P_2O_5, respectively between 76.2 and 90% K_2O in 24h, in comparison with classical fertilizers, which lose by levigation 75% P_2O_5, respectively 86,5% K_2O. Regarding the nutrients lost by levigating, the behavior of fertilizers with microbial biomass is quite similar to complex fertilizers, and for this reason, the impact generated by them is insignificant

***Key words**: fertilizer, levigation, microbial biomass.*

GOOD PRACTICES FOR REDUCING LAND POLLUTION IN THE AREA OF SWINE FARMS WITH LIQUID MANURE

Mihaela Alexandra ROTARU, Loredana VĂDUVA, Olimpia Alina IORDĂNESCU, Ioan PETROMAN

University of Life Sciences "King Mihai I" from Timisoara,
119 Calea Aradului, Timisoara, Romania

Corresponding authors emails: olimpia.iordanescu@yahoo.com,
loredana_heber@yahoo.com

Abstract

The pollution of surface or underground water sources is done by physical, chemical, and biological means, the ecological effects manifesting themselves through the modification of abiotic factors and implicitly all trophic levels. Evacuated unprocessed, untreated and accidentally ending up in emissions or on the ground, the liquid wastes contribute to the heating of the water and the decrease of oxygenation degree determined by the acceleration of the organic mass decomposition phenomena and on the soil by degrading its quality by increasing the amount of nitrogen. These effects the more visible in the researched area, Arad County in the vicinity of swine farms and especially in the area of former treatment plants belonging to disused farms, where the waters of the area, due to the activity of aerobic microorganisms, flourished and some species of fauna and flora even disappeared if the discharged faeces, after a certain processing the CBO_5 parameter had 45.1-55.0 $mg \cdot L^{-1}$.

Key words*: environmental pollution, good practices, manure, swine.*

COMPARATIVE ANALYSIS ON AIR POLLUTION LEVEL OF BUCHAREST URBAN AREA DURING THE COVID-19 PANDEMIC

Vasilica VASILE, Cristian PETCU, Alina DIMA, Mihaela ION

National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development - URBAN-INCERC, 266 Pantelimon Road, District 2, Bucharest, Romania

Corresponding author email: vasile@incd.ro

Abstract

The pollution level of urban area is often high, mainly due to the traffic conditions that can lead to pollutant emissions such as nitrogen dioxide (NO_2) and particulate matter (PM), negatively affecting inhabitant's health. However, this level of traffic had a strong decrease, given the lockdown of the population imposed by the COVID-19 pandemic. Thus, the present paper is a comparative analysis on air pollution level, before and during the two periods of lockdown. For this, the concentrations of specific traffic pollutants, suspended particles (PM2.5) and nitrogen dioxide (NO_2), were monitored. According to the obtained results, PM2.5 values have been lower with 37.5% and 54.8 %, in trend with those from San Jose (45%) or Los Angeles (41%). Likewise, NO_2 concentrations decreased with 62.3 % in the first month and with 57.0% in the second month of the lockdown, similar with values recorded in London (40%) or Barcelona (70%). The analysis showed that air pollution can be reduced and considering the importance of heath for inhabitants, long-term solutions must be found.

Key words*: air pollution, COVID-19 pandemic, environmental monitoring, health effects.*

EARTH OBSERVATION AND GEOGRAPHIC INFORMATION SYSTEMS & TOPOGRAPHY AND CADASTRE

RELATIONSHIPS BETWEEN SPECTRAL VEGETATION INDICES (SVIs) AND GROWTH STAGES IN A TABLE GRAPE VINEYARD

Zhulieta ARNAUDOVA, Boyan STALEV

Agricultural University - Plovdiv, 12 Mendeleev Blvd, Plovdiv, Bulgaria

Corresponding author email: julieta_arnaudova@abv.bg

Abstract

Table grape is a crop with a high nutritional value and frequent control is a guarantee of high quality and yields. The application instruments and methods for remote monitoring in obtaining information on the status of the vineyard will allow farmers to respond adequately to changes in plant development and grape quality. The aim of this study is to use non-destructive methods, such as satellite monitoring in the prediction of phenological changes that occur in the vine crop. The object of the study is a commercial table grape vineyard Vitis vinifera cv Velika in the land of village Granit, Stara Zagora district, Bulgaria in the period 2021-2023. NDVI was calculated using data from Sentinel 2 satellite in the main growth stages. The physiological state of the vines and the growth behaviour in the crop were monitored. An analysis was made of the relationship between the dynamics of the growth and NDVI to predict the yields.

Key words*: NDVI, remote sensing, vineyards, vegetation indices.*

DETERMINATION OF LAI AT DIFFERENT GROWTH STAGES OF PEPPER PLANTS GROWN IN FIELD

Zhulieta ARNAUDOVA, Dimka HAYTOVA

Agricultural University - Plovdiv, 12 Mendeleev Blvd, Plovdiv, Bulgaria

Corresponding author email: julieta_arnaudova@abv.bg

Abstract

The leaf area index (LAI) is important for monitoring and assessing crop vigor. It is used in the evaluation of plant condition, as inputs in various models to predict productivity. The main aim of this study was to identify the changes in LAI between major growth stages of pepper. In situ measurements and time series imagery from Copernicus Land Monitoring services were used. In situ data collection was carried out in a production pepper plantation, cv. Slonsko uho, is grown under open field conditions in the village of Katunitsa, Plovdiv region, Bulgaria. Measurements were carried out in different stages of the development of plants. The destructive determination of LAI was conducted after collection of plant samples. The leaf area was determined using an electronic plotter Image Analysis Systems "WinDias 3". The leaf area index was calculated as the ratio of plant leaf area covering a unit of land area. The LAI imageries were downloaded for two years (2022 and 2023), between different stages of the development of pepper. A correlation between satellite data and in situ measurements was established. The dependence of LAI on the time series for the two years was determined.

Key words*: pepper, productivity, vegetation indices.*

SOME ASPECTS REGARDING THE USE OF REMOTE SENSING IN THE STUDY OF SOIL EROSION IN AGRICULTURE

Gabriel BADESCU[1], Mihail SUSINSKI[1], Gabriel TANASIE[2], Cristian POPESCU[1], Emilia CONSTANTINESCU[1], Marin OSICEANU[1]

[1]University of Craiova, 19 Libertatii Street, Craiova, Romania
[2]University of Petrosani, 20 Universitatii Street, Petrosani, Romania

Corresponding author emails: m_susinski@yahoo.com, emilia.constantinescu@edu.ucv.ro, popescucristian07@yahoo.com

Abstract

Remote Sensing is an effective and modern tool for identifying soil erosion in agriculture and its evolution over a period of one year or longer. The paper presents the use of the LEOWORKS 4.0 software, but also the Snap software in the study of soil erosion in agriculture. With its help, various supervised or unsupervised reports or classifications can be made. In agriculture in general, various phenomena can occur, which can influence soil erosion and these can be highlighted with the help of satellite remote sensing recordings. A case study is presented in the area of Oltenia, Dolj County, using the LEOWORKS 4.0 software and the European Space Agency`s Snap software, using supervised and unsupervised classification. The use of remote sensing combined with the use of drones and photogrammetry and GNSS and geographic information systems solves any problem in monitoring and identifying soil erosion and its evolution over a year or longer.

Key words*: GNSS, Remote Sensing, Snap software, soil erosion in agriculture.*

PAST AND FUTURE - A PERSPECTIVE OF THE EVOLUTION OF INEU`S FORESTS

Marinela BODOG, Alexandru RACZ, Nicu Cornel SABĂU

University of Oradea, 1 Universitatii Street, Oradea, Romania

Corresponding author email: mbodog@uoradea.ro

Abstract

This paper aims to investigate the evolution of the land base by land use categories: arable land, grassland, forests, and other wooded land. Specifically, the case study will analyse the evolution of the areas occupied by forest vegetation, included in the National Forest Fund, and managed by the Bihor Forestry Directorate through the Oradea Forestry Office, within the U.P.U.III Ineu, according to forest management plans referring to period 2007-2016 and 2017-2026. The research focuses on the evolution of the structural and qualitative characteristics of the stands, respectively the implementation and the results of the forest management plans for the studied stands, during the mentioned period, using the QGIS software. A comparative analysis will also be made of the ten-year plans for harvesting wood products and carrying out natural and artificial regeneration. The importance of these analyses lies in their ability to provide quick solutions to various problems encountered in current practical activities in the forestry sector.

Key words*: geographic information system, forestry, forest regime, trees.*

GIS METHODS FOR ESTIMATING SOIL EROSION AND ITS IMPACT ON THE ENVIRONMENT. CASE STUDY: CRIŞUL ALB HYDROGRAPHIC BASIN

Loredana COPĂCEAN[1, 2], Eugen Teodor MAN[1], Sorin HERBAN[1], Luminiţa COJOCARIU[2, 3], Cosmin POPESCU[2]

[1]Politehnica University of Timisoara, 2 Victoriei Square, Timisoara, Romania
[2]University of Life Sciences "King Mihai I" from Timisoara,
119 Calea Aradului, Timisoara, Romania
[3]Agricultural Research and Development Station Lovrin,
200 Principala Street, Lovrin, Romania

Corresponding author email: luminita_cojocariu@usvt.ro

Abstract

In Romania, in recent decades, many facilities to combat soil erosion have been abandoned, which leads to the amplification of the effects of this phenomenon, with repercussions on the environment. In this context, through this study, it is aimed to apply a spatial analysis model to identify areas susceptible to soil erosion, to establish the intensity of this phenomenon, but also to analyze its impact on the environment, at the level of the Crişul Alb basin. GIS technique and Universal Soil Loss Equation (USLE) were used. Through this equation, the following factors, participants /determinants of soil erosion were taken into account: climatic aggressiveness, land topography, soil characteristics, vegetation cover, land improvement measures. The soil erosion map at basin level, was classified into five classes, respectively areas with very low, low, moderate, high and very high susceptibility to soil erosion. The results show that 74% of the territory belongs to the class of susceptibility to very low erosion, and 4% with high and very high erosion rates, these being the main "hot spots" that must be taken into account in the development strategies of the hydrographic basin.

Key words*: GIS models, impact, USLE, watershed.*

3D MODELING OF THE CAMPUS OF THE UNIVERSITY OF AGRICULTURAL SCIENCES AND VETERINARY MEDICINE CLUJ-NAPOCA USING ARCGIS PRO

Iulia COROIAN, Diana FICIOR, Tudor SĂLĂGEAN, Silvia CHIOREAN, Ioana Delia POP, Mircea-Emil NAP, Elemer-Emanuel ȘUBA

University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Manastur Street, Cluj-Napoca, Romania

Corresponding author emails: silvia.chiorean@usamvcluj.com, diana.ficior@usamvcluj.ro

Abstract

The 3D modeling process consists of a three-dimensional representation of an object or a surface using certain specialized software. The 3D modeling was done by using a point cloud resulting from a drone flight. GIS applications enable the analysis of spatial locations by creating and layering information through maps or 3D scenes. In order to create the 3D model of the land, the ortophotomap resulting from a photogrammetric drone flight was used. The generation of the orthophotomap and the dense point cloud offers the possibility of making digital measurements, exporting and creating a database for making applications and drawing up interactive maps according to the user's wishes. The purpose of this work is to use the latest methods of obtaining photogrammetric data with the help of drones, but also to create interactive maps that allow studies and spatial analysis to be carried out. The case study was carried out on the campus of the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca using the photogrammetric method and GIS analysis. To obtain the orthophotomap and photogrammetric data, it was decided to fly with the DJI Phantom 4 RTK drone. The analysis of the orthophotomap of the campus and the dense point clouds allowed the graphical representation of the cartographic elements in the ArcGIS PRO application, respectively ArcGIS Online, offering the possibility of accessing them in real time, which represents an up-to-date process and to be taken into account for conducting studies and spatial analyses. The maps created, both in 2D and 3D format, as well as the WEB applications have the purpose of providing users with data regarding the shape, location, character and arrangement within the campus of the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca of the most important component buildings, taking into account their character.

Key words*: 3D modeling, databases, GIS, Photogrammetry, Web map.*

INTEGRATED APPROACH FOR LANDFILL MONITORING USING GEOSPATIAL AND EARTH OBSERVATION DATA

Iulia DANA NEGULA[1], Cristian MOISE[1], Mihaela Violeta GHEORGHE[2], George BOLDEANU[2]

[1]University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd, District 1, Bucharest, Romania
[2]GMV Innovating Solutions, Calea Floreasca, District 1, Bucharest, Romania

Corresponding author email: iulia.dana@fifim.ro

Abstract

The monitoring of landfills is important due to the associated environmental risks that relate to soil, water and air pollution. Using an extensive collection of Earth Observation (EO) and geospatial data, the present research demonstrates the applicability of an integrated approach, through use-cases pertaining to several landfills located in Romania. The solution combines time series of optical and synthetic aperture data (SAR) data as well as various geospatial data provided by the European Union`s Copernicus thematic services, and exploits spectral remote sensing indices, land surface temperature, SAR polarimetric parameters, along with satellite-derived atmospheric information. By providing specific, accurate and systematic information about the landfills, the results of the study are relevant for the environmental authorities and the general public given their essential role for communities.

Key words*: geospatial data, landfill monitoring, satellite imagery.*

ANALYSIS OF LANDSAT AND SENTINEL SATELLITE IMAGES FOR ROȘIA POIENI QUARRY AND VALEA ȘESII DECANTATION POND

Sorin HERBAN[1], Clara-Beatrice VÎLCEANU[1], Andrei CRIȘAN[2], Livia NISTOR-LOPATENCO[3]

[1]Politehnica University Timisoara, Civil Engineer Faculty, Department of Overland Communication Ways, Foundations and Cadastral Survey, 1 Ioan Curea Street, Timisoara, Romania
[2]Politehnica University Timisoara, Civil Engineer Faculty, Department of Steel Structures and Structural Mechanics, 2 Traian Lalescu Street, Timisoara, Romania
[3]Technical University of Moldova, Faculty of Construction, Geodesy and Cadastre, 41 Dacia Blvd, Chisinau, Republic of Moldova

Corresponding author email: beatrice.vilceanu@upt.ro

Abstract

Taking into consideration the valuable spectral information and its wide coverage, satellite remote sensing is an efficient and accurate instrument to analyse and monitor the Earth`s surface over time, even the negative consequences of irresponsible anthropic activities. The present paper aims at monitoring in time the Roşia Poieni quarry and the negative effects resulting from the copper and gold exploitation, which led to the existence of the Valea Şesii tailing pond. To this purpose, Landsat satellite images were analysed over a 30-year period from platforms that offer free downloads. Image processing consisted of cropping the images according to the area of interest, applying the RGB combination and classifying them in order to obtain the surfaces. Moreover, for the images taken in 2018, 2020 and 2022, indices for vegetation and water were applied. In order to obtain a more realistic image and to observe the differences, for the specified years, namely 2018, 2020 and 2022, Sentinel satellite images were processed in parallel.
Despite the small size of the study area, satellite remote sensing has succeeded in delivering plausible, noteworthy results with great emphasis on hard-to-reach areas.

Key words*: remote sensing, mining, monitoring, tailing pond, image processing.*

EXPLORING THE COSMOS: A WEB-BASED APPLICATION FOR POLLUTION, CONSTELLATION AND MOON PHASE RECOGNITION

Mihai MAFTEI, Iuliana MARIN

National University of Science and Technology POLITEHNICA Bucharest, 313 Splaiul Independentei, District 6, Bucharest, Romania

Corresponding author email: marin.iulliana25@gmail.com

Abstract

Throughout human history, the fascination with celestial objects and the night sky has persisted. This article introduces a web-based application designed to assist users in identifying constellations, light pollution that obscures stars in the night sky, along with moon phases in astronomical photographs. The application utilizes image processing techniques and template matching to achieve this recognition, enabling users to explore the cosmos independently. The article outlines the methodology, including the creation of constellation templates and the process of image normalization and matching. It also discusses the mathematical calculations involved in star recognition and moon phase determination. The application's user-friendly interface and feedback from users are presented, indicating a positive response. The article concludes by highlighting the potential for further development, including the conversion of the application into a mobile version and the addition of features such as air pollutants indices, a moon phase calendar, and zodiacal data. The application is poised to be a valuable tool for astronomy enthusiasts, navigators, and those interested in exploring the mysteries of the night sky.

Key words*: constellations, image processing, moon phase, stars, template matching.*

REMOTE ASSESSMENT OF THE FRACTION OF ABSORBED PHOTOSYNTHETICALLY ACTIVE RADIATION (fAPAR) FOR MOUNTAIN GRASSLANDS

Margareta MAGUREANU[1], Loredana COPACEAN[1], Despina-Maria BORDEAN[1], Luminita COJOCARIU[1, 2]

[1]University of Life Sciences "King Mihai I" from Timisoara, 119 Calea Aradului, Timisoara, Romania
[2]Agricultural Research and Development Station Lovrin, 200 Principala Street, Lovrin, Romania

Corresponding author email: luminita_cojocariu@usvt.ro

Abstract

The work focused on the analysis of the vegetation cover of the grasslands according to the Fraction of Absorbed Photosynthetically Active Radiation (fAPAR index), in five different stages, during the same year (2022), on altitudinal levels, from three groups of mountains. 110 grasslands located in different environmental conditions were studied, from: the Banat Mountains, the Poiana Ruscă Mountains and part of the Southern Carpathians. Five Sentinel 2 satellite scenes were used, acquired on the following dates: 22.03, 16.05, 15.07, 08.09, 18.10 and the Digital Elevation Model, classified into 8 altitudinal levels, from 53 – 2473 m. The results show that the fAPAR values are different, lower in March when the vegetation is still stagnant and does not use solar radiation, maximum in July when the vegetation is very well represented and uses maximum solar radiation, and from August, a downward trend, along with the reduction of the physiological activity of the plants in the grasslands. Also, differences in average fAPAR values by mountain groups and similarities in altitudinal steps between mountain groups were noticed.

Key words*: fAPAR, grasslands, seasonal variation, spatial variation.*

APPLICATION OF MACHINE LEARNING APPROACHES FOR LAND USE CHANGE MODELLING IN SURINAME

Tamara MYSLYVA[1], Marciano DASAI[1], Christiaan Max HUISDEN[2], Petro NADTOCHIY[3], Yurii BILYAVSKYI[4]

[1]Ministry of Spatial Planning and Environment of Suriname, 22 Prins Hendrikstraat, Paramaribo, Republic of Suriname
[2]Anton de Kom University of Suriname, Leysweg, 86, Paramaribo, Republic of Suriname
[3]Institute of Agriculture of Polissia NAAS of Ukraine, Kyiv highway, 132, Zhytomyr, Ukraine
[4]Zhytomyr Agricultural Technical Professional College, 96 Pokrovska Street, Zhytomyr, Ukraine

Corresponding author email: byrty41@yahoo.com

Abstract

Machine learning (ML) algorithm-based models represent cutting-edge techniques used for mapping, quantifying, and modelling changes in land use and land cover (LULC) over time. In this study, a comparative analysis was conducted on the multilayer perceptron neural network (MLP) and support vector machine classification (SVM) applied to LULC change detection and forecasting within the coastal plain territory of Suriname. Sentinel-2A satellite data covering the period from 2017 to 2022 was utilised, along with additional variables such as the distance from rivers, roads, and administrative cities in each district and slope and digital elevation models in the prediction models. The SVM algorithm-based predictive model, incorporating an urbanization transition sub-model, exhibited an impressive accuracy of 83.85%, surpassing the MLP algorithm-based model, which did not exceed 64.63%. Consequently, this model is recommended for generating LULC change prediction maps. These maps can serve as a crucial baseline for the Surinamese government, providing valuable insights for policy development and sustainable land use management.

Key words: *detection, modelling, machine learning, remote sensing, Suriname.*

THE EFFECT OF THE ALTITUDE GRADIENT ON THE VEGETATION OF THE GRASSLANDS IN THE POIANA RUSCĂ MOUNTAINS, BASED ON NDVI

Monica SFÎRCOCI[1], Loredana COPĂCEAN[1], Luminiţa COJOCARIU[1, 2]

[1]University of Life Sciences "King Mihai I" from Timisoara,
119 Calea Aradulului, Timisoara, Romania
[2]Agricultural Research and Development Station Lovrin,
200 Principala Street, Lovrin, Romania

Corresponding author email: lorecopacean@yahoo.com

Abstract

The relief is the main factor that determines the "vertical" arrangement of the vegetation. Starting from this hypothesis, the aim of the study is to quantify the influence of the altitudinal gradient on the vegetation cover of the grasslands and to test the condition of maintaining this influence over time. The Normalized Difference Vegetation Index (NDVI) was used, applied to Sentinel 2 images from March, May, July, August, October. It was established that, in grasslands, the average values of NDVI are minimum in spring, beginning of the vegetation season (0.3743), increase in May (0.6775) and reach the maximum in July (0.8233 - high degree of coverage). In autumn, the vegetation cover decreases (NDVI = 0.6258). On the altitudinal gradient, in spring, vegetation cover decreases with increasing altitude (r = -0.85), in summer, it is "uniformly" distributed, and in autumn, it increases simultaneously with altitude (r = 0.5831), against the background of maintaining a temperature-precipitation ratio optimal on the upper floors. The use of NDVI in the analysis of grassland provides a global picture and the possibility of expanding the analysis in different research directions.

Key words*: altitudinal variation, grasslands, NDVI, vegetation.*

ASPECTS REGARDING THE USE OF GNSS METHODS, IN THE CADASTRE OF PASTURE AND FORESTRY LANDS IN BISTRITA-NASAUD COUNTY

Gabriel BADESCU[1], Mihail SUSINSKI[1], Emilia CONSTANTINESCU[1], Cristian VASILE[1], Petre SAVESCU[1], Gabriel TANASIE[2]

[1]University of Craiova, 19 Libertatii Street, Craiova, Romania
[2]University of Petrosani, 20 Universitatii Street, Petrosani, Romania

Corresponding author emails: m_susinski@yahoo.com, emiliaconst2000@yahoo.com, cristi_vasile_4you@yahoo.com

Abstract

The present work presents the use of GNSS methods in the cadastre of pasture and forestry lands in Bistrita-Nasaud county, Feldru commune, Nepos and Feldru localities. In the Bistrita-Nasaud county, there are many private forestry detours that are managed by private entities but also by the municipalities in the related areas. Within our country, there are several differences regarding the history of the cadastre, these being influenced by the temporal arrangements that existed over time in the provinces of Romania. GNSS measurement methods have revolutionized the measurement technique, but they must be carefully used in areas where satellite signals are very weak or non-existent, here are some examples of this type. The general cadastre, the specialized cadastre and the systematic cadastre are those which, during a related period after the promulgation of the Law of the cadastre and real estate advertising no. 7/1996, with the changes and up-to-date updates, have outlined and define the modern cadastre in our country. At the end, some suggestions and assessments are made regarding the use of GNSS methods, in the forest land cadastre.

Key words*: GNSS, cadastre of pasture, measurement technique, cadastre of land.*

EXPLORING THE TOP 5 DRONES FOR LAND MEASUREMENTS: A REVIEW

Alexandru CĂLIN

University of Agronomic Sciences and Veterinary Medicine of Bucharest,
Faculty of Land Reclamation and Environment Engineering,
59 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: alexcalin@fifim.ro

Abstract

In the paper titled "Exploring the Top 5 Drones for Land Measurements", we conduct a comprehensive analysis of the latest drone technology applied in the field of geospatial surveying. The study evaluates five leading drone models based on their accuracy, efficiency, and cost-effectiveness in land measurement tasks. Through a series of field tests and data comparisons, the paper highlights the strengths and limitations of each drone, providing insights into their suitability for various surveying contexts. The findings aim to guide professionals in selecting the most appropriate drone technology for their specific land measurement needs, ultimately contributing to more informed decision-making in the industry. This abstract summarizes the paper's intent to bridge the gap between drone technology and practical application in land surveying.

Key words*: AI, drones, future, land, measurements.*

ISSUES RELATED TO THE IMPLEMENTATION OF GEOMATIC APPLICATIONS IN THE NATIONAL FORESTRY FUND

Ghiţă Cristian CRAINIC

University of Oradea, 1 Universitatii Street, Oradea, Romania

Corresponding author email: gccrainic@yahoo.com

Abstract

The development of various geomatic applications in the forest requires advanced technologies for collecting, transferring, and processing data from the field, related to the spatial positioning of various topographic details. Special software is also required to report the coordinates of detail points and obtain various graphical products. In the forestry sector, planning maps, in analogue and/or digital format as appropriate, are used for various practical applications. The exploitation of cartographic material in digital format, with high accuracy, involves a process of spatial transformation or georeferencing, for which a few at least four points of known coordinates, are required in the two working systems. The positioning of the points required for the georeferencing process is performed with Global Navigation Satellite System (G.N.S.S.) technology, with a G.P.S. system and/or with total station (TS), as appropriate. The MapSys 10.0 software can be used to perform the spatial transformation process. The results obtained in this case study ensure that the georeferenced raster is used with optimal accuracy to solve various current problems in the forestry sector.

Key words: *geomatic applications, forest fund, GNSS technology, GPS system, forest map, MapSys 10 program.*

THE USE OF GEOMATICS FOR THE PLANNING OF A SPORTS COMPLEX

Cornel Cristian TEREŞNEU

Transilvania University of Brasov, 25 Eroilor Street, Brasov, Romania

Corresponding author email: cteresneu@unitbv.ro

Abstract

In this paper, a topographical survey was carried out and the resulting data were processed for the development of the Zănoaga area in Bran, as a multifunctional sports complex. For the existing ski slope, all field data were collected, and a corresponding database was constructed. For the rest of the area, a comprehensive survey was conducted to establish the routes for a summer toboggan run, a tubing installation, and a bike trail (with multiple variants). A ComNav T300 GNSS equipment was used. Field data were initially processed in AutoCAD Civil 3D and then imported into ArcGIS. In this latter program, the initial 3D profile, and the possible profiles for optimal operation of the mentioned facilities were created. A program model was built in GIS through which the user can choose the suitable slope according to their experience, and the construction mode of the summer slope was simulated, based on projected speed.

Key words*: sports complex, GIS, geomatics, VBA sequences.*

MISCELLANEOUS

REDUCING THE ENVIRONMENTAL IMPACT BY USING A SUSTAINABLE PROTEIN SOURCE IN FISH DIET - INSECT MEAL: A REVIEW

Alina ANTACHE[1, 2, 3], Ira-Adeline SIMIONOV[1, 3], Stefan-Mihai PETREA[1, 3], Aurelia NICA[3], Catalina ITICESCU[1, 4], Puiu Lucian GEORGESCU[1, 4], Catalin PLATON[5], Alin-Stelian CIOBÎCĂ[2, 6, 7, 8]

[1]"Dunarea de Jos" University of Galati, REXDAN Research Infrastructure, 98 George Cosbuc Street, Galati, Romania
[2]"Alexandru Ioan Cuza" University of Iasi, Faculty of Biology, 20A Carol I Blvd, Iasi, Romania
[3]"Dunarea de Jos" University of Galati, Faculty of Food Science and Engineering, 111 Domneasca Street, Galati, Romania
[4]"Dunarea de Jos" University of Galati, Faculty of Sciences and Environment, 111 Domneasca Street, Galati, Romania
[5]"ROMFISH", National Association of Fish Producers, 12A Nicolae Iorga Boulevard, Iasi, Romania
[6]Centre of Biomedical Research, Romanian Academy, 8 Carol I Blvd, Iasi, Romania
[7]Academy of Romanian Scientists, 54 Splaiul Independentei Street, District 5, Bucharest, Romania
[8]Apollonia University, 11 Pacurari Street, Iasi, Romania

Corresponding author email: alina.antache@ugal.ro

Abstract

Due to the growth intensification in the aquaculture industry, it is desirable to ensure fish production and improve it in a sustainable manner. It is known that the protein source from fish diet is represented by the fish meal which is very expensive. Obtaining fishmeal requires quite a lot of pressure on fish stocks in the natural environment due to overfishing, which leads to a drastic reduction of stocks. For this reason, it is desirable to find sustainable alternative sources that can replace the protein from fish meal. Therefore, was tried the replacement with soy, sorghum or wheat meal, but their production involves a very large cultivation area. Recently, was made some research on the fish growth and welfare effect in case of replacement of fish meal with insect meal. In conclusion, it has been demonstrated that the insect meal has a much higher nutritional value and has a low impact on the environment (low footprint, less water and feed consuming), but the selection of optimal insect species for the production of protein for fish feed represents a considerable challenge.

Key words*: environmental impact, insect meal, overfishing, sustainable protein source.*

DETERMINATION OF HARDENING SOIL MODEL (HSM) PARAMETERS FROM FIELD AND LABORATORY TESTING

Ioan BOTI[1], Vasile FARCAS[2], Adrian ANDRONIC[1], Ernest OLINIC[1]

[1]Tehnical University of Civil Engineering of Bucharest,
122-124 Lacul Tei Blvd, District 2, Bucharest, Romania
[2]Technical University of Cluj-Napoca, 28 Memorandumului Street,
Cluj Napoca, Romania

Corresponding author email: ioanboti@yahoo.com

Abstract

Hardening soil model (HSM) is a very used and helpful tool when we talk about soil modelling and geotechnical computations. The present paper presents several methods from which one may obtain the needed parameters, step-by-step. The results from oedometer tests and consolidated drained triaxial tests are used, for the laboratory testing. For granular materials like sandy soils, we propose a method to obtain HSM parameters from SPT tests. Some validations of results are presented at the end of this paper, using Plaxis FEM software. By detailing diverse methods to obtain requisite parameters, this study contributes to enhancing the applicability and versatility of the Hardening Soil Model, broadening its utility across various soil types and testing scenarios and making it more practical among engineers.

Key words*: hardening soil model, HSM parameters, E_{50}, E_{oed}, N_{spt}.*

TRENDS IN "FETEASCĂ REGALĂ" GRAPES YIELD AND SUGAR CONTENT IN SITE SPECIFIC CLIMATE

Octav CISMAȘU[1], Ioan OROIAN[1], Marcel DÎRJA[2], Cristian IEDERAN[1], Antonia ODAGIU[1]

[1]University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Faculty of Agriculture, 3-5 Calea Manastur, Cluj-Napoca, Romania
[2]University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Faculty of Silviculture and Cadastre, 3-5 Calea Manastur, Cluj-Napoca, Romania

Corresponding author email: antonia.odagiu@usamvcluj.ro

Abstract

In this article we analyse the evolution of the grapes yield and their sugar content belonging to "Fetească Regală" vineyard variety cultivated in climatic conditions of Transylvanian region, Romania, covering the time period 2020-2022. In each experimental year, daily temperatures and precipitations were recorded during the grapevine vegetation period. Grapevine yield and sugar content was recorded at the end of each vegetation period. Averages were calculated yearly and by entire experimental period. Descriptive statistics and multi regression approach were implemented to calculate de averages, dispersion parameters, significance of differences, and relationships between the climatic factors and production traits. Overall datasets concerning grapes yields and their sugar content expressed a normal distribution. Our study emphasizes that precipitations have low influence on grapes yields and their sugar content, while temperature is positively associated with both above mentioned quantitative traits. When expressed by experimental years, increased temperatures led to higher yields and sugar content, significant differences are reported among yearly values.

Key words*: precipitations, production, temperature, vineyard, quantitative traits.*

TRADITIONAL ROMANIAN CULINARY PRACTICES AND THEIR HISTORICAL AND CULTURAL SIGNIFICANCE

Carlo Marius DRAGOMIR[1], Simona-Maria ILIE[1], Mariana-Atena POIANA[1], Corina Dana MISCA[1], Ileana COCAN[1], Delia-Gabriela DUMBRAVĂ[1], Camelia MOLDOVAN[1], Viorica-Mirela POPA[1], Carmen Daniela PETCU[2], Claudia ROMAN[3], Diana-Nicoleta RABA[1]

[1]University of Life Sciences "King Mihai I" from Timisoara, 119 Calea Aradului, Timisoara, Romania
[2]University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd, District 1, Bucharest, Romania
[3]Universidad de Huelva, Campus de "El Carmen", Huelva, Spain

Corresponding author email: diana.raba@usvt.ro

Abstract

Food symbols, along with other important values in different aspects of life, individualize Romanian folk culture in relation to other cultures. Research in the field of traditional Romanian food has increased greatly in last year's resulting in many books, studies and articles that approach the changing complexities of taste and the world of food and its cooking. In this paper are presented the main traditional Romanian culinary practices in the context of their historical and cultural characteristics. Results of the study shown that, Romania is noted for a large number of traditional foods and drinks. Romanian culinary practices are mainly determined by regional distinctions. In last years, as a consequence of industrialization, Romanian culinary practices have undergone a general trend of transformation and alignment to the imposed production and distribution standards, society has witnessed undermining of traditional food cultures.

Key words*: culinary practices, cultural aspects, romanian gastronomy, traditional dishes.*

SIR JOSEPH WILLIAM BAZALGETTE - THE INGENIOUS CIVIL ENGINEER WHO HAS CHANGED LONDON

Elena NISTOR

University of Agronomic Sciences and Veterinary Medicine of Bucharest,
59 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: elena_nistor@yahoo.com

Abstract

The year 2024 marks the 205th anniversary of the birth of Sir Joseph William Bazalgette (1819-1891), the English civil engineer best known as the mastermind behind the sewerage system for Central London which he devised in the second half of the 19th century, in response to the Great Stink. In the summer of 1858, the hot weather increased the stench of the untreated human and industrial waste deposited on the banks of the Thames and into the river, resulting in about 12,000 fatalities due to contagious diseases. As Chief Engineer of the Metropolitan Board of Works, Bazalgette's solution was to build a sewer network that would collect the waste water and waste matter flowing freely on the London streets. Proposed in 1858, his project was completed in 1875. The complex infrastructure, consisting of 132 km (82 miles) of underground sewers, about 2,100 km (1,300 miles) of street sewers, and four pumping stations (Deptford, Crossness, Abbey Mills and Chelsea Embankment) has fundamentally reshaped the sewage system of the English capital and is still in use, making London the city it is today.

Key words*: London, pumping station, sewage system, the Great Stink, the Thames.*

A REFINEMENT OF THE SECOND CRITERIA OF COMPARISON FOR THE COVERGENCE OF SERIES OR IMPROPER INTEGRALS

Cosmin-Constantin NIȚU

University of Agronomic Sciences and Veterinary Medicine of Bucharest,
Faculty of Land Reclamation and Environmental Engineering,
59 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: cosmin.nitu@fifim.ro

Abstract

The second criterion of comparison for the convergence of series or improper integrals, also called the limit comparison test, is a little bit unnatural and difficult for students when it comes to finding the comparison term. In this paper we give a refinement of this criteria via equivalents, which is more natural. We say that two sequences or two functions are equivalent if their quotient tends to 1 at some point. When two sequences or two integrable functions are equivalent, then their associated series or integrals have the same nature. We also present different applications of this method for both series and improper integrals.

Key words*: equivalent, limit comparison test, improper integrals, series.*

THE INFLUENCE OF TECHNOLOGY ON CULTURE IN THE PRODUCTION OF LETTUCE IN THE NUTRIENT FILM TECHNIQUE SYSTEM: A REVIEW

Oana Alina NIŢU[1], Emanuela JERCA [2], Elena Ştefania IVAN[3], Marinela GHEORGHE[1]

[1]University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Land Reclamation and Environmental Engineering, 59 Marasti Blvd, District 1, Bucharest, Romania
[2]University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Horticulture, 59 Marasti Blvd, District 1, Bucharest, Romania
[3]University of Agronomic Sciences and Veterinary Medicine of Bucharest, Research Center for Studies of Food Quality and Agricultural Products, 59 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: elena.ivan@qlab.usamv.ro

Abstract

The NFT (Nutrient Film Technique) technology is one of the hydroponic methods used for cultivating plants, including lettuce. In this system, the plant roots are suspended in a continuous flow of nutrient solution, which is pumped through an inclined channel or a thin tray. This thin flow of nutrient solution allows the roots to receive essential nutrients such as nitrogen, phosphorus, and potassium, along with other necessary substances for healthy plant growth. The system utilizes a minimal amount of water because the water and nutrients are constantly recirculated within the system, thus reducing waste and the need for irrigation. By precisely monitoring and adjusting the composition of the nutrient solution, growers can ensure that plants receive the optimal amount of nutrients to grow healthily and produce quality yields.

Key words*: hydroponic system, green salad, optimizing water input, recycling and resource conservation.*

EXPLORING THE USE OF WEB APPLICATIONS AND NEURAL NETWORKS FOR CAR PARKING SERVICES

Dan-Constantin PUCHIANU

Valahia University of Targoviste, 13 Sinaia Alley,
Targoviste, Romania

Corresponding author email: pdantgv@yahoo.com

Abstract

Intelligent parking systems that capitalize on the characteristics of deep-learning architectures have become an important point of research due to their ability to improve efficiency, reduce traffic congestion and improve the experience of drivers. The availability and ineffective management of parking spaces is a major problem in most cities, leading to traffic congestion and pollution. This study aims to introduce a state-of-the-art implementation of intelligent parking systems using neural networks and web application development. The optimization of neural networks enables careful analysis of images and videos from surveillance cameras to quickly identify available parking spaces in real time. These implementations offer innovative solutions for drivers looking for parking spaces, thus reducing the time spent searching for them and reducing traffic congestion. The development of a web application was proposed to complete the implementation part of the study using trained neural networks to provide a useful user interface for displaying available parking spaces. This study aims to open the way to automated parking, predictive parking availability and smart parking systems. Compared to other architectures, the proposed models have demonstrated superior performance, and the effective use of these technologies can improve smart-city practices and reduce the impact of traffic pollution on the environment.

Key words*: deep-learning, image processing, intelligent parking, neural networks, sustainability.*

ROMANIA TOWARDS A GREEN TRANSITION: CARBON BORDER ADJUSTMENT MECHANISM (CBAM) REGULATIONS

Cristiana SÎRBU

University of Agronomic Sciences and Veterinary Medicine of Bucharest,
Faculty of Land Reclamation and Environmental Engineering,
59 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: cris_sirbu@yahoo.com

Abstract

The paper aims to highlight the steps our country needs to take to achieve green economy and industry, defining the new adopted regulations regarding the greenhouse gas emissions embedded in goods imported. The Carbon Border Adjustment Mechanism (CBAM) is a price adjustment dedicated to goods carrying CO_2 emissions that enter the European Union. The main purpose of CBAM is to prevent the risk of carbon leakage and by encouraging the reduction of emissions by operators in third countries (countries outside the EU), global carbon emissions should be reduced. Carbon Border Adjustment Mechanism is an instrument used to achieve a greener industry, economy and life, a tool to a green transition.
The paper presents the basis and decisions made in time and seeks to identify the measures that need to be taken so that we can all contribute to what it means to decarbonize the European Union.

Key words*: carbon, European Union, emissions, green transition, regulations.*

PHYTOCHEMICAL PROFILE OF LEMON BASIL GROWN IN AQUAPONIC CULTURE

Irina TOMASU, Simona MARCU SPINU, Mihaela DRAGOI CUDALBEANU, Constanta MIHAI, Petronela ROSU, Raluca PASCU, Alina ORTAN

University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: rosupetronelamihaela@yahoo.com

Abstract

A traditional aromatic culinary plant, basil (Ocimum spp.) also offers a wide range of potential health benefits, including antioxidant, anti-inflammatory and anticarcinogenic effects. Multiple varieties cultivated around the world, ranging from the traditional Ocimum basilicum - sweet basil to Genovese basil, cinnamon basil, purple basil, holy basil etc, were investigated for their therapeutic properties due to their high content of antioxidant compounds. The aim of this study was the phytochemical analysis of a Romanian basil hybrid with a strong lemon flavour from S.C.D.L. Buzau. To promote a circular economy, the lemon basil was grown together with yeast biomass fed fish in an aquaponic system. The samples consisted of basil grown with: different percentages of yeast biomass added to conventional fish feed, regular fish feed and traditional soil based technologies. The phytochemical composition of the samples was assessed following microwave-assisted extraction. The evaluation included antioxidant activity (DPPH, FRAP, ABTS assays), as well as total phenolic and flavonoid contents. Among the 14 compounds identified in the HPLC-DAD investigation, caffeic acid and rosmarinic acid had the highest content in all the samples.

Key words*: Ocimum basilicum, aquaponic culture, antioxidant activity, total phenolic count, flavonoid content, HPLC-DAD.*

ISSN 2457-3248
ISSN-L 2457-3248