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THE EFFECT OF FRAGMENTED RAINFOREST VEGETATION ON THE ADAPTATION STRATEGY OF FRANCOLIN BIRDS (*FRANCOLIN BICALCARATUS*) IN BANGEM, SOUTHWEST REGION, CAMEROON

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ABSTRACT

Habitat fragmentation is a growing threat to many species globally, particularly those living in tropical rainforests. Francolins are an integral part of the tropical rainforest ecosystem in Cameroon, playing important roles as seed dispersers, insect and small prey consumers, and prey for larger predators Their presence helps maintain the balance and diversity of the forest food web, hence their conservation in Cameroon is crucial for maintaining the ecological balance, supporting local livelihoods, preserving cultural heritage, and contributing to the sustainable management of the country's valuable rainforest resources. However, the study investigates the impact of fragmented rainforest vegetation on the survival strategy of the Francolin bird (*Francolin bicalcaratus)* in Bangem region. The study was conducted over a 5-month period in two forest sites with varying levels of fragmentation, a contiguous primary forest, and a highly fragmented edge habitat. Data was collected through direct observations during the first 15 days of each month. The results indicate that Francolin birds exhibit significant behavioral adaptations in response to forest fragmentation. Nonetheless, fragmented rainforest vegetation significantly associated with aggregation of francolin birds r=0.650 P=0.000, climatic conditions r=0.514 P=0.000, and food-type X^2=59.312 df=2 P=0.000 respectively. The conversion of rainforest habitats into a mosaic of forest fragments and cropland has had a significant impact on the aggregation and distribution patterns of Francolin birds (*Francolin bicalcaratus*) in Cameroon's Southwest Region. Besides, there was a significant relation between Fragmented rainforest vegetation and the hourly day-period X^2=66.086 df=2 P=0.000. Francolins are known to have distinct activity patterns throughout the day, with specific times of the day when they are more active in foraging, breeding, and other behaviors. More so, Anthropogenic activity and seasonal changes associated significantly X^2=68.159 df=1 P=0.000. Furthermore, the social behaviour of francolins and their vocalization frequency revealed a significant link X^2=32.417 df=6 P=0.000. The study highlights the remarkable plasticity of Francolin birds in adapting to habitat changes. However, the long-term viability of these survival strategies under ongoing deforestation and fragmentation remains uncertain. These findings underscore the importance of maintaining large, contiguous forest tracts to support the full range of Francolin behavioral and ecological adaptations.

Keywords: Francolin birds, Habitat fragmentation, Primary Forest, Survival strategy, Vegetation

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IMPACT OF HOSTILITIES ON THE ENVIRONMENT OF THE NORTHERN REGION OF UKRAINE

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ABSTRACT

The Chernihiv region is located in the north of Ukraine, on the border with Russia and Belarus. Therefore, it has had a significant negative impact and horrific consequences from Russia's military aggression. During the period of the Russian military siege of Chernihiv (37 days), the aggressor state was causing irreparable and catastrophic damage. At the same time, indirect losses may manifest in the coming years and decades and these consequences are unpredictable. And now the enemy fired and destroys the border of the region every day. Undoubtedly, the war had a very negative impact on each component of the environment: phytocenosis, microbiocenosis, zoocenosis, hydrobsein, air, soil. The consequences will be long -term and will not only be local but also global.

Key words: impact of hostilities, environment, northern region of Ukraine.

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ECOLOGICAL CONSCIOUSNESS AND SUSTAINABLE DEVELOPMENT: BRIDGING ENVIRONMENTAL EDUCATION WITH GREEN ECONOMY PRACTICES

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ABSTRACT

This article explores the core discourses shaping the concept of sustainable development (SD), with an emphasis on its multidimensional nature. The study identifies seven key discursive axes: environmental, economic, social, political, prognostic, ethical, and developmental sustainability. The analysis highlights the pivotal role of ecological consciousness, advocating for the integration of environmental education to promote sustainable practices across various societal groups, including youth and professionals. A central argument is the need for a holistic approach that considers the biosocial unity of humans, balancing the natural and social dimensions of human existence. The study further examines the relationship between natural capital and development, endorsing a transition to a "green" economy focused on resource conservation and minimizing environmental impacts. The ethical dimension of SD, particularly the responsibility toward future generations, is emphasized as crucial for sustainable decision-making. The paper calls for further research on the efficacy of environmental education and the practical implementation of SD policies across different sectors and regions. Acknowledging the limitations of current data and the challenges of incorporating ethical principles into policy frameworks, the article provides a comprehensive philosophical and practical foundation for understanding sustainable development and addressing its future challenges.

Keywords: Environmental consciousness, Natural capital, Ecological ethics, Biosocial unity, Sustainability education, Political sustainability

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EPIDEMIOLOGIC DATA OF COVID-19 IN CHILDREN

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ABSTRACT

Objective: This study aims to provide a comprehensive understanding of the epidemiology, clinical presentation, and risk factors associated with hospitalization in pediatric COVID-19 cases. Material and Methods: This cross-sectional study included 663 children aged 0-14 who presented to the Emergency Department of the Pediatric Hospital in Elbasan, Albania, between April 2020 and September 2024, with suspected COVID-19 symptoms. Sociodemographic and clinical data were collected, including symptomatic status, source of infection, underlying conditions, and disease outcomes. Multivariable logistic regression analysis was used to identify risk factors for hospitalization. Results: The mean age of children was 6.8 years, with 88.7% symptomatic and 11.3% asymptomatic. Among symptomatic individuals, the most commonly reported symptom was fever, affecting 65.2% of the population. Upper respiratory symptoms were present in 44.5%, while 3.6% experienced lower respiratory symptoms. The majority (79%) experienced mild illness. In the multivariable analysis, infants <1 year had a significantly higher likelihood of hospitalization compared to children aged 5-9, (OR) of 1.83 (95% CI: 1.11–3.98, p=0.029). Also, lower respiratory symptoms, OR of 2.1 (95% CI: 1.13–5.31, p =0.012) and children with underlying conditions were at higher risk of hospitalization, OR of 2.7 (95% CI: 1.15–7.40, p=0.001). The majority of children (97.7%) recovered fully, with only 2.3% experiencing post-acute complications. Conclusion: This study emphasizes the importance of monitoring vulnerable subgroups, such as infants and those with respiratory symptoms or underlying conditions, to prevent severe outcomes and guide public health interventions.

Keywords: Pediatric COVID-19, Epidemiology, Risk factors, Hospitalization

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PREDICTIVE MODELING OF HOUSING CONSTRUCTION IN RUSSIA: INSIGHTS FROM ARIMA AND LOCAL REGRESSION ANALYSIS

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ABSTRACT

The purpose of this work is to identify the fundamental factors influencing the dynamics of residential real estate construction in order to further predict the population's housing supply. The problem that analysts face is the relatively short time series with annual data characterizing this market. Earlier methodological approaches to forecasting short-term series suggested the use of exponential moving averages, Holt-Winters modeling, ARIMA, LSTM neural networks, LOESS and others, mainly in Europe and the USA. In this study, the authors present the results of forecasting the dynamics of residential real estate construction in Russia using the ARIMA model, as well as a variety of series decomposition (STL) methods and taking into account all the rules of the Holt-Winters model.

Keywords: Housing market, regression analysis, short series, indicator system.

Vol. 14 (4): 41-48 (2024)

DIGITAL AXIOLOGY IN THE EDUCATIONAL ENVIRONMENT: FEATURES OF THE FORMATION OF DIGITAL BEHAVIOR OF YOUNG PEOPLE

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ABSTRACT

The purpose of the work is to analyze the transformation of the digital behavior of young people in the educational environment through the prism of the axiological approach. It is substantiated that the main problematic point of digitalization from an axiological perspective can be considered its generation of moral relativism, which results in moral irresponsibility, lack of initiative and permissiveness. The historical experience of university education in modern conditions often turns out to be unaccounted for: the value and worldview component of the educational process and its orientation towards the formation of human spirituality are lost. In this regard, an axiological analysis of the digital socialization of youth in the educational environment unfolds along with the identification of the historical trend of transformation of university education. The novelty of the study lies in the conclusion that education can act in this case as an institution for the rule-making of digital ethics, as well as the transmission of national values in the context of a "global digital village". The basis for this conclusion is an appeal to historical models of universities in terms of identifying their potential. The work contributes to the formation of a new disciplinary field – digital axiology.

Keywords: Axiology, Digital Behavior, Digital Socialization, Education, Digital Ethics, University, Identity.

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COMMENTS ABOUT THE GENETIC DIVERSITY PHENOMENON IN THE FISH COMMUNITY OF LAKE SHKODRA

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ABSTRACT

This article presents some scientific comments on the genetic diversity phenomenon appearing in some fish species of Lake Shkodra. The material is taken from various publications that are in the references for some of the species that are included in the list of fish species of Lake Shkodra by Dhora (2020), Maric (2018). In particular, data were obtained on the intraspecific diversity of the most important fish in fishing sector. These phenomena have been commented on by linking them to various ecological factors. The concrete phenomena discovered and commented on in this article are *Alosa agone*, *Carassius gibelio*, *Chondrostoma nassus*, *Cyprinus carpio*, *Leucos basac*, *Perca fluviatilis*, and *Salmo farioides.* The experienced geneticists, who have been missing until now, should be included in studies and monitoring. Maybe it's time to establish special institutions that would contribute to the smooth running of these developments.

Keywords: intraspecific diversity, population, evolution, fish, species, genotypes, phenotypes.

Vol. 14 (4): 55-60 (2024)

EXPLORING THE IMPACT OF CULTURAL AND ECO-TOURISM ON YOUTH AWARENESS OF HERITAGE AND SUSTAINABILITY

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ABSTRACT

The study explores the role of various types of tourism, particularly cultural and eco-tourism, in enhancing a sense of national identity and appreciation among the youth. It examines how integrating these forms of tourism into educational frameworks can deepen students' understanding of their national heritage, encompassing both cultural and natural dimensions, and promote a stronger connection to their cultural and environmental surroundings. The authors employ a comprehensive literature review alongside case studies of successful cultural and eco-tourism initiatives, utilizing statistical methods to analyze survey data. The findings suggest that cultural tourism, enriched with ecological elements, significantly enhances youth engagement with cultural landmarks and natural landscapes. The study concludes that incorporating cultural and eco-tourism into educational programs offers a valuable approach for fostering an informed and culturally aware generation. By promoting a holistic connection to cultural heritage and natural environments, this approach supports the development of environmentally responsible and heritage-conscious individuals.

Keywords: cultural tourism, patriotism, youth, attractions, outlook, educational programs.

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APPLICATION OF IPS INDEX BASED IN EPILITHIC DIATOMS and PHYSICO CHEMICAL DATA FOR EVALUATION OF WATER QUALITY

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ABSTRACT

The studies conducted in this research work emphasizes on the use of Sensitive Pollution Index (IPS) based on epilithic diatom community towards evaluation of water quality in Shkodra Lake. Benthic diatoms are the groups of diatoms, which are less vulnerable to disturbances be they of a physical, chemical or other nature thus making the convenient indices for the ecosystem under consideration. Benthic diatoms were gathered from five sampling sites situated in proximity to the shores of Shkodra Lake, including: Shterbeq (Sh1), which is close to the Montenegro border Kompleksi Hysaj (Sh2), Vraka (Sh3), Shiroka (Sh4) and Zogaj (Sh5). The findings reveal that the water quality is not uniform over the space meaning that there are some human socio-economic activities and some natural factors that are affecting the ecological state of the lake. In total, two field trips were conducted in Decembre 2023 and May 2024. It is often found that, as compared to diatoms, chemical indicators of water quality are of less reproductive value. Nevertheless, because their communities can assimilate rising concentrations of both organic as well as inorganic chemical constituents, they are often preferred for in situ biomonitoring. This study shows that some significant shifts in species composition can be detected in relation to changes in dominance patterns of specific species from Shkodra Lake's aquatic communities. The identified dominant species include a total of 92 diatom species, including most dominant species like as: *Cocconeis placentula* var. *lineata* (Ehrenberg) *Van Heurck, Cymbella affinis* Kützing *agg.*, *Eunotia glacialis* F. Meister 1912, *Gomphonema olivaceum* (Hornemann) Brébisson var. *olivaceum, Cyclotella ocellata* Pantocsek, *Aulacoseira granulata* (Ehrenberg) Simonsen, *Fragilaria incognita* E. Reichardt, *Gomphonema truncatum* Ehr., *Nitzschia dissipata* (Kützing), etc. About 88 species belong pennate diatoms and four belong centric diatoms. The proceedings of this research include the application of the IPS index and water quality assessment for different locations in Shkodra Lake, proving the detail of the water quality assessment conducting by mean of the IPS index and the crucial role diatoms play in monitoring freshwaters (Prygiel J. and Coste M, 1993; Miho et. al., 2010)). In our study, the IPS (sensitive pollution index) has been calculated also to show the connections between BOD, COD, total and P determination., Nitrates, Nitrites, pH, etc. The Sensitive Pollution Index fluctuated between moderate and very good quality but only Shiroka station was classify as Poor quality.

Keywords*:* Shkodra lake, karstic lake, epilithic diatoms, Sensitive Pollution Index, water quality.

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RELATIONSHIP OF DIATOM COMMUNITIES TO CHEMICAL VARIABLES IN BUTRINTI LAGOON IN ALBANIA

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ABSTRACT

Lagoons are distinctive ecosystems where river and sea waters converge, supporting a distinctive biodiversity in the brackish waters. Like all aquatic ecosystems, lagoons are vulnerable to natural and anthropogenic factors that impact physicochemical variables and aquatic biota, particularly those that are environmentally sensitive, such as phytoplankton. Aquatic organisms that are susceptible to changes in water chemistry, pollution, and trophic state, like diatoms, are utilized for environmental assessment. The Butrinti lagoon is significant within the southern region of Albania. Consequently, this study was initiated with the objective of evaluating the water quality based on chemical variables and diatom assemblages. The chemical parameters and trophic index of the Butrinti lagoon waters indicate a trophic status ranging from mesotrophic to eutrophic. This finding aligns with the trophic classes of diatoms, which were observed to range from mesotrophic to eu-polytrophic. Additionally, the results revealed the presence of 42 distinct species of diatoms, comprising 15 genera of pennate diatoms and 3 genera of centric diatoms.

Key words: Butrinti lagoon, trophic status, chemical variables, diatom's assemblages

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ENVIRONMENTAL AND ECONOMIC LOSSES IN DAIRY PRODUCTION DUE TO BLOOD-SUCKING INSECTS IN COWS

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ABSTRACT

This study investigates the impact of midge attacks on milk production in cows and explores effective methods to protect cattle from blood-sucking dipterans, which pose significant environmental and economic challenges to livestock farming. The research was conducted to quantify milk production loss associated with midge activity and to assess the effectiveness of an aerosol-based protective method against these pests. Standardized procedures were applied to monitor the population dynamics of blood-sucking insects during peak daily activity (12:00-16:00 and 19:00-21:00) from 2018 to 2023. Entomological surveys took place at Horobut LLC in Central Yakutia's Megino-Kangalassky district, yielding a total of 2728 mosquitoes and 4100 horseflies. Species identification was performed using morphological keys. The study revealed that the midge flight season spans over 30 days, while the grazing period for Simmental cows (n=93) in the study area lasts approximately 120 days. During this period, the cows produced an average of 1461 kg of milk with 4.05% fat and 3.10% protein content, and a daily yield of 12.1 kg. The economic impact of reduced productivity due to midge attacks was estimated at 5,097,600 rubles. A novel aerosol fogging technique was successfully tested for the first time in Central Yakutia, utilizing a 0.01% aqueous pyrethroid emulsion with 70-120 micron droplet dispersion. Applied at 10 ml per cow, this method provided up to 6 hours of protection, presenting a viable solution for reducing insect-related milk losses while minimizing environmental impact.

Keywords: agricultural regions of Yakutia, cattle, mosquitoes, horseflies, economic threshold, harmful population.

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OCCURRENCE OF HEAVY METALS IN THE BUTRINTI LAGOON ECOSYSTEM IN THE SOUTH OF ALBANIA

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ABSTRACT

The Butrinti Lagoon, located in southern Albania, is a vital ecosystem recognized for its rich biodiversity, including the mussel species *Mytilus galloprovincialis*. As a widely consumed bivalve mollusc, the cultivation of this species is crucial, and assessing heavy metal contamination in their tissue is essential for ensuring food safety. This study aims to evaluate the presence of heavy metals in the food chain within the Butrinti Lagoon. Four heavy metals-copper (Cu), chromium (Cr), cadmium (Cd), and lead (Pb), were analyzed in soil, sediment, water, and mussel samples. The findings revealed that heavy metal concentrations in soil samples followed the order Cr > Cu > Pb > Cd, with Cr showing the highest value (378.01 mg/kg). In sediment, the metal concentrations were ranked as Pb > Cu > Cr > Cd, with Pb having the highest concentration (64.23 mg/kg). Similarly, in water samples, Pb was the dominant metal (1803 µg/L), with the order being Pb > Cd > Cu > Cr. Mussel samples also exhibited the highest concentration of Pb, followed by Cr, Cu, and Cd. The consistent presence of Pb at elevated levels across sediment, water, and mussel samples suggests a strong correlation between these matrices, potentially due to the release of Pb from sediments into the water and its subsequent absorption by mussels.

Key words: Heavy metals, *Mytilus galloprovincialis*, Butrinti lagoon, food security.

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EVALUATION OF ECOLOGICAL STATUS OF SHKODRA LAKE BASED ON BENTHIC DIATOMS AND MACROPHYTE INDEXES

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ABSTRACT

The evaluation of the trophic state of Shkodra Lake is based on biomonitoring, aquatic macrophytes, and diatoms, which are correlated with organic pollution and nutrient enrichment. Five sampling sites were selected in the Albanian portion of Shkodra Lake. In this study, we focused on the correlation between diatom and macrophyte indexes as bioindicators of lake water quality. Both significant organisms demonstrated a response to eutrophication gradients. The growth and distribution of submerged macrophytes are influenced by changes in the nutrient concentrations of their surrounding environment. Conversely, diatoms are capable of absorbing nutrients from both the sediment and the overlying water. Diatoms and macrophytes thus serve as integrators of environmental conditions to which they are subjected, rendering them suitable for use as long-term indicators with high spatial resolution. The Trophic Diatom Index (TIDIA), the Saprobic Index (SI) in accordance with the Macrophyte Index (MI), provides a link between ecological data and management decisions. The dominant species were rigid hornwort (*Ceratophyllum demersum*), (*Potamogeton perfoliatus*) and shining pondweed (*Potamogeton lucens*). These species are associated with moderate to very high nutrient enrichment. The data indicates that the levels of nutrient enrichment and trophic state, as well as the Macrophyte Index (MI), exhibited considerable variation between the Vraka and Shiroka sites. The MI (at Vraka) was recorded at 3.5, and TI_{DIA} value in this site is the highest at 2.5. The water quality oscillated from mesotroph (in Shterbeq), meso-eutroph (in Kompleski Hysaj, Shiroke and Zogaj) to eutroph (in Vraka). Despite the differing assessment approaches, a consensus was reached on the optimal implementation of the WFD to achieve a more favorable ecological status in the long term.

Keywords: Shkodra Lake, Biological monitoring, Diatom Index, Macrophytes Index, Saprobic Index, Nutrients, WFD.

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ECOLOGICAL IMPACTS OF ROAD NETWORK DENSITY ON LANDSCAPES IN NIZHEGORODSKOE POVOLZH'E NATIONAL PARK

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ABSTRACT

The article presents the results of the correlation between the indicator of the density of the road network, reflecting the degree of anthropogenic pressure, and natural features, that determine the economic attractiveness of landscapes and the possibility of laying roads on their territory. The density of the road network serves as an integral indicator of the intensity of development of the territory and generally reflects the degree of their preservation. Being a product of historically established relationships between the features of the relief, hydrographic network, soil and vegetation cover and the nature and intensity of economic development, the indicator of the density of the road network on the one hand is formed under the influence of the landscape features of the territory, on the other hand, it can be considered as one of the economic properties of the landscape, allowing it to outline and characterize. The object of the research is the territory of the Pustynsky section of the Nizhegorodskoe Povolzh'e National Park (Russia). In the course of the research, the results were obtained: a comprehensive assessment of the state of landscapes in the territory of the Nizhegorodskoe Povolzh'e National Park was carried out, indicators of landscape determinism of anthropogenic pressure on the territory were calculated through an analysis of the density of the road network.

Keywords: Sustainable national park management, Ecosystem vulnerability, Landscape fragmentation, Anthropogenic pressure, Karst ecosystems.

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ECOLOGICAL CONTRIBUTIONS OF CITIZEN SCIENTISTS: AVIFAUNA COMPOSITION IN DEPLETED PEAT PIT RESERVOIRS OF NIZHNY NOVGOROD

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ABSTRACT

The study aimed to evaluate the contribution of citizen scientists in identifying bird species in human-altered environments, specifically depleted peat pits in the Nizhny Novgorod oblast. The methods involved collecting and analyzing birdwatching records from the iNaturalist platform, focusing on eight IBAs with significant contributions. These records were compared with published species lists to calculate the extent of new species identifications. Results showed that citizen scientists contributed significantly to the avifauna data, identifying on average 50% of the total bird species recorded in these areas, with some IBAs showing up to 85.7% species contribution. The findings also highlighted a correlation between citizen science activity and the proximity of IBAs to major population centers. The most motivated citizen scientists have made a significant contribution to the study of the avifauna of IBAs.

Keywords: Important Bird Areas (IBAs), iNaturalist platform, Biodiversity monitoring, Anthropogenic habitats, Human-transformed ecosystems.

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ASSESSMENT OF THE ENDANGERED LEPIDOPTERAFAUNA OF THE SHKODRA LAKE AREA AS A FACTOR IN PRESERVING THE BIODIVERSITY VALUES OF THIS ECOSYSTEM

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ABSTRACT

This study, analyses 30 endangered species of butterflies and their endangered status, according to the IUCN, are identified in the area of special ecological importance such as that of Lake Shkodra. The analyzed species are respectively represented as: The Risk category LR is represented by 3 types; The risk category DD is represented by 2 types; The risk category VU is represented by 25 types. The study is based on field collection, identification and comparison with the literature of these endangered species, aiming to preserve the values of this natural ecosystem. The recommendations for increased care towards species threatened with extinction, will contribute to the health of this ecosystem and will promote strategies that will lead to the preservation of biodiversity, not only of lepidoptera, but also of other living things of this the ecosystem through its continuous monitoring.

Keywords: Shkodra lake area, region, threatened Lepidoptero fauna, monitoring biodiversity, IUCN, category.

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ASSESSING BIODIVERSITY IN FOREST ECOSYSTEMS USING ECOLOGICAL INDICES CASE STUDY OF THE MEDITERRANEAN CONIFEROUS FOREST AT DIVJAKË-KARAVASTA NATIONAL PARK

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ABSTRACT

The association between habitat and tree diversity was examined using a tree data collection of 29 plots in the Mediterranean coniferous forest at Divjakë-Karavasta National Park. A total of 75 plant taxa—consisting of 17 orders, 34 genera, 24 families, and 833 individuals—were identified from the field observation. The three most prevalent tree species in the area were *Ulmus campestris* L. (10.4%), *Pinus halepensis* Mill. (15.6%), and *Pinus pinea* L. (30.7%). *Pinus pinea* L. had the maximum stand density of 256 individual's ha^{-1} and the largest base area of 20.36 m^2 ha^{-1}, with the highest number (22) found in S25. *Pinus halepensis* Mill. with 130 individuals ha^{-1} and a basal area of 20.31 m^2 ha^{-1}, had the second-highest stand density. A few species have dominated the forest structure in all 29 plots, and many species have fewer individuals, according to the Shannon index value (H'=2.35) for the entire research region. The Simpson index (D) data for the full test surface in the study indicates a good degree of variety among the forest trees observed on this surface, with a value of 0.8. The species richness index, which ranges from 0.14 to 1.6 for examined surfaces, shows variation in the measured values. The Berger-Parker Index's overall representative value for the study area is 0.3. The study provides baseline data for the management of protected areas in developing countries such as Albania and illustrates the potential of the *in situ* method in the conservation of natural resources.

Keywords: diversity index, stand structure, tree density, forestry economy, conservation.

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ECOLOGICAL DYNAMICS AND FLORISTIC DIVERSITY IN THE BOREAL ECOTONE OF THE VOLGA BASIN: A STUDY OF KNYAGININSKY DISTRICT

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ABSTRACT

The study aims to refine the floristic composition data of the Knyagininsky district in the Nizhny Novgorod region, a key area representing the botanico-geographical features of the boreal ecotone of the Volga basin. To achieve this, a combination of field research, thematic maps, remote sensing data, and literature review was used. The research involved extensive fieldwork conducted in 2020, surveying 60 observation points in various landscapes affected by different degrees of anthropogenic pressure. The vegetation was thoroughly documented, resulting in the identification of 156 species of higher plants across 126 genera and 51 families, some of which were previously unrecorded in the area. The fact of the growth of a number of species not previously noted in this botanico-geographical area is established. The importance of flora researches for understanding the physico-geographical processes in the region is noted. The well-developed Knyagininsky district of the Nizhny Novgorod region is characterized by a significant presence of feral cultivated species. This indicates a significant change in natural ecosystems, the emergence of free ecological niches in them. Result of the anthropogenic change in the territory is the weakening of the clinal nature of the boreal ecotone.

Keywords: Biodiversity conservation, Forest-steppe transition, Habitat fragmentation, Red-listed species Ecological restoration, Anthropogenic landscape transformation.

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ADVANCES IN AGRICULTURAL IMAGE SEGMENTATION: FROM TRADITIONAL TECHNIQUES TO DEEP LEARNING APPROACHES

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ABSTRACT

In recent years, image segmentation has been widely applied to solve problems in various fields. With the application of deep learning in machine vision, the excellent performance has been transferred to agricultural image processing by combining them with traditional methods. Segmentation methods have revolutionized the development of agricultural automation and are commonly used to analyze uniform sowing, crop type, identify pests, diseases, etc. This paper provides a review of the recent advances in traditional and deep learning-based methods for agricultural image segmentation. We present traditional methods that can effectively utilize the original image information and the high performance of deep learning-based methods. The review introduces key agricultural image datasets. The main metrics for evaluating the quality of image segmentation are presented, and the evaluation results of various classical and deep learning-based segmentation methods are presented.

Keywords: image segmentation, agricultural images, deep learning, neural networks, segmentation quality metrics.

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ECOLOGICAL RISKS: ASSESSMENT AND MANAGEMENT

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ABSTRACT

This article investigates the role of ecological risk management in the digital economy era. The purpose of this article is to identify the key patterns that determine the characteristics of risk assessment in business as a fundamental element contributing to the economic security of an organization, as well as to perform a comparative analysis of risk assessment and management methods in emergency situations. Various risk management methods are used in modern economic analysis. The most effective ways to reduce risk in the face of economic and political instability in Russia are the scenario method and the hierarchy analysis method, as well as diversification, i.e., the distribution of risks among multiple business participants. This article will mainly address hazards in the natural and man-made spheres.

Keywords: model, threat, risk management, ecology, safety.

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BIBLIOMETRIC ANALYSIS OF DIGITAL TWIN DESIGN FOR SUSTAINABLE DEVELOPMENT AND COOPERATION BETWEEN INDUSTRIAL ENTERPRISES

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ABSTRACT

Designing digital twins of business processes as individual elements to establish cooperative links between enterprises represents a relevant and promising area of research. This approach directly contributes to sustainability goals by enhancing resource efficiency, fostering collaboration, and supporting data-driven decision-making. Bibliometric analysis enables the assessment of the current state of this field and the identification of key directions for its future development, including its alignment with sustainability policies. Notably, the study of designing digital twins of business processes remains underexplored, particularly from the perspective of cross-model design technology. This technology integrates digital twins of different business processes to facilitate real-time interaction and collaboration, optimizing industrial ecosystems for sustainable outcomes. The main objective of this article is to provide a systematic review of the literature on designing digital twins of business processes as individual elements to establish cooperative links between enterprises. The reviewed studies, sourced from Google Scholar, Scopus, and Web of Science, include publications in scientific journals and conference proceedings. Despite advancements, significant discussions and uncertainties persist regarding cross-model engineering technology, particularly concerning the integration platform for digital twins, knowledge schema, cross-model data exchange, and the collaboration framework, all of which have profound implications for sustainable industrial development.

Keywords: business process, cross-model design, sustainability, manufacturing efficiency, process optimization.

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DEVELOPING ENVIRONMENTALLY ADAPTED SIMULATORS FOR AUTONOMOUS MINING DUMP TRUCKS: A MULTI-CRITERIA APPROACH TO ENHANCE SUSTAINABILITY AND ECOLOGICAL SAFETY

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ABSTRACT

The study explores the selection and development of simulators tailored for autonomous mining dump truck control systems, with a focus on sustainability and environmental adaptation. Mining operations pose unique challenges due to extreme weather conditions, varied terrain, and restricted visibility, which necessitate specialized simulators to ensure effective and eco-friendly solutions. By leveraging multi-criteria analysis, this research evaluates simulator capabilities to optimize resource use, minimize ecological risks, and enhance operational safety. The use of simulation environments mitigates real-world risks such as emissions, environmental contamination, and damage to ecosystems, while enabling efficient training and testing of autonomous systems. Additionally, the study underscores the importance of integrating ecosystem-specific parameters into simulation models to address climate variability and reduce the carbon footprint of development processes. The findings provide actionable insights for designing sustainable and environmentally conscious autonomous control systems in the mining industry.

Keywords: environmental adaptation in simulation, safety in autonomous operations, multi-criteria decision analysis.

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SUSTAINABLE ECOLOGICAL HEALTH OF LIVESTOCK FARMS, THE IMPACT OF A BETULIN-CONTAINING FEED ADDITIVE ON CLINICAL AND HEMATOLOGICAL PARAMETERS IN BREEDING CALVES AND DAIRY COWS

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ABSTRACT

The study was conducted at the dairy complexes of the breeding farm of the Agricultural Enterprise Kolkhoz "Soznatelny," Zubtsovsky District, Tver Region (Russia), in collaboration with the Department of Disease Diagnostics, Therapy, Obstetrics, and Animal Reproduction, and the Medical and Diagnostic Center of the Moscow State Academy of Veterinary Medicine and Biotechnology - MVA named after K.I. Skryabin (Russia). Betulin was administered orally to each animal in the experimental group at a dose of 10 mg/kg of body weight with water, once daily for 14 days. Clinical examinations and hematological analyses were conducted at the experiment's beginning and end to evaluate betulin's effects on the animals and exclude concomitant diseases. An Abacus Junior Vet automatic hematology analyzer (Austria) was used for blood analysis. Parameters assessed included erythrocyte, leukocyte, platelet, lymphocyte, basophil, monocyte, eosinophil, and segmented neutrophil counts, as well as hemoglobin levels, color index, anisocytosis index, and hematocrit values. The results demonstrated that betulin positively influenced the hematological parameters of five- and ten-month-old breeding calves. The drug significantly increased the number of peripheral blood lymphocytes, alleviated neutrophilic leukocytosis, and reliably reduced neutrophil, monocyte, and total leukocyte counts, all within the physiological norm. These findings suggest that betulin stimulates lymphocyte proliferation and enhances phagocytosis, leading to inflammation resolution, a decrease in neutrophil and monocyte levels, and an increase in lymphocyte counts. The observed reduction in erythrocyte and hemoglobin levels by the end of the experiment in all experimental groups was likely due to weather conditions. On the first day of the experiment, intense heat may have caused polycythemia, while cooler temperatures on the final day could have mitigated this effect.

Keywords: betulin, breeding farm, blood analysis, hematological parameters, clinical parameters, oral administration, body weight.

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METHODS OF STUDYING SOIL INDICATORS OF AGROECOSYSTEMS

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ABSTRACT

Soil is a key component of the ecosystem, providing a number of useful services to humans. Many driving factors threaten the sustainable functioning of soils, and therefore the entire agroecosystem. This article discusses soil indicators for studying the state of agroecosystems. A list of methods and the course of work are given in detail. Soil research allows for rational use of the sowing area, makes it possible to observe changes in the composition and properties of the soil, obtain data on the amount of nutrients available to the plant and its fertility, and helps to choose suitable seeds and fertilizers. The results of the analysis and recommendations of a specialist allow you to determine the best time for sowing and get a larger harvest.

Keywords: soil, soil indicators, research methods, agroecosystems, agriculture, fertility.

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ENHANCING URBAN AIR QUALITY AND TRAFFIC FLOW: MULTIMODAL SOLUTIONS FOR UNSIGNALIZED JUNCTION EFFICIENCY AND SUSTAINABLE CITY DEVELOPMENT

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ABSTRACT

Ensuring clean air in the city is one of the tasks of ensuring the quality of life of the population and the principle of sustainable development of the city as an ecosystem. On the elements of the road network, a high concentration of pollutants occurs when their capacity decreases and time delays for drivers and pedestrians increase. The global trend of assessing the quality of service of elements of the road network includes a multimodal or integrated approach that takes into account the needs of all road users. The article presents the results of a study of the length of the queue of cars at unsignalized junctions at the same level, a formula for determining the minimum distance for placing a queue of cars in front of a pedestrian crossing is proposed, design solutions for the arrangement of measures to increase the capacity of traffic lanes and unsignalized junctions are proposed. The proposed method takes into account the influence of the coefficients of reduction to a passenger car on the length of the queue of cars and the choice of a design solution to increase the capacity of an unsignalized junction in conditions of high traffic congestion. The application of the proposed measures will increase the efficiency, taking into account the multimodal approach to taking into account the opinions of drivers and pedestrians.

Keywords: capacity, level of service, unsignalized junction, unsignalized intersection, urban network, pedestrian, traffic.

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STUDY OF CORROSION RESISTANCE OF NANOMODIFIED CONCRETE IN BIOLOGICALLY AGGRESSIVE ENVIRONMENTS

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ABSTRACT

The impact carried out at the atomic-molecular level in the development of nanocomposites is a relevant area of modern research in construction materials science. One of the key methods for creating nanocomposites is their modification using various additives and specialized technological processes. This article presents the results of testing concrete modified with nanoparticles in the context of studying their biological corrosion, which is one of the factors affecting the durability of concrete and reinforced concrete structures. As part of the experimental study, microbiological diagnostics was carried out, as a result of which the composition of biofilms was determined. The results of strength tests demonstrated a significant effect of biocorrosion on the strength characteristics of nanomodified cement concrete. Graphs displaying changes in the concentrations of Ca2+ cations in the liquid phase showed their increased values compared to conventional uninfected concrete, which is associated with the products of microorganisms. Measurements of the pH level of concrete samples showed that the influence of a biologically aggressive environment leads to an increase in the pH level.

Keywords: cement concrete, corrosion, nanomodification, strength, biostability.

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DEVELOPMENT OF TECHNOLOGIES FACILITATING THE TRANSITION TO RENEWABLE ENERGY SOURCES: OPPORTUNITIES FOR APPLICATION OF REACTIVE HYDRO-STEAM TURBINES FOR LOW-POTENTIAL HEAT RESOURCES

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ABSTRACT

The study discusses the opportunities for producing geothermal energy, which is a renewable resource providing a continuous supply of heat from the Earth's interior. Unlike fossil fuels, which are non-renewable and cause environmental degradation, geothermal energy is of great interest to researchers, particularly in the context of sustainable development principles. The authors demonstrate the advantages of a new hydro-steam turbine (HST) using the heat of water from geothermal springs and heating boilers for power generation. The HST is designed as a Segner wheel with a steam-water mixture flowing out of a Laval nozzle, the resulting reactive force driving the turbine rotor and the power generator. The features of the HST thermodynamic process are analyzed in the form of a case study describing the design of a 20 kW plant and providing the technical specifications of the installation for a heating boiler plant: hot water flow rate of 7 kg/s, temperature of 130°C, and inlet pressure of 0.6 MPa. The authors present the thermal schemes of the HST in two variants (at a boiler house and as a part of a geothermal power plant). The study concludes that the main advantages of the HST are the absence of elements subject to erosion under the action of steam and water flow and the simplicity of the design increasing the availability of geothermal energy for power generation. Among the limitations of the HST is its low economic efficiency narrowing down its application to conditions where geothermal fields are available for local power supply.

Keywords: steam-water mixture, nozzle, temperature, pressure, rotor, boiler house, GeoPP, separation, condensation.

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UNIFIED METHODOLOGICAL FOUNDATIONS FOR SUSTAINABLE RECREATIONAL ENVIRONMENTAL MANAGEMENT: A FRAMEWORK FOR TOURISM AND NATURAL RESOURCE CONSERVATION

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ABSTRACT

The development of methodological foundations for organizing recreational environmental management is a significant step towards sustainable and efficient use of natural resources, contributing to environmental preservation and improving people's quality of life. The lack of a unified approach to recreational activities poses challenges for planning and management, as well as increasing the risk of harm to natural environments due to excessive use. In this context, the development and implementation of a standardized methodology for managing recreational use is crucial for the sustainable and efficient utilization of natural resources, while promoting environmental preservation and enhancing the quality of life for people. Based on an analysis of various factors such as natural conditions, cultural heritage, economic growth, infrastructure, and environmental issues, it is possible to assess the potential for future development in recreational environmental management. This assessment can help identify key challenges and develop strategies for addressing them. Through this process, we can gain a better understanding of how to sustainably manage recreational areas while preserving cultural and natural resources for future generations.

Keywords: ecological management, natural concervation, recreational impact assessment

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AGRICULTURAL LAND FERTILITY AND THE RISKS TO AGRICULTURAL SUSTAINABILITY: A CASE STUDY FROM ALBANIA

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ABSTRACT

In the current environment, intentional agricultural intensification without adequate soil fertility recovery could jeopardize agriculture's sustainability, especially in nations like Albania where the sector continues to dominate the national economy. In order to prevent soil degradation, it is helpful to assess the amount of plant nutrient depletion from soils for future planning and recovery. The nutrient-balance approaches, which are based on best practices, are tools for providing indicators of the sustainability of agriculture. The purpose of this study was to assess the nutrient balances (nitrogen, phosphorous, and potassium) in Albania's arable land. Over an 11-year period, the nutrient balances for 12 major agricultural plants were determined using the soil surface nutrient balance method developed by the Organization for Economic Co-operation and Development (OECD). Mineral fertilizer, organic fertilizer, atmospheric deposition, and biological N fixation were among the elements that were quantified as inputs. Harvested plant and fodder plant production were among the outputs.

Keywords: nutrients, phosphorous, nitrogen, soil degradation, productivity.