

EDITORIAL COMMENT

Dear readers,

In the second issue of the EEEP journal for 2025, edited on English language, you will have the pleasure to get closer and familiar with nine scientific articles, included in six main rubrics – *Ecological and Sustainable Agriculture*, *Bioautomatics and Bioinformatics*, *Forest Ecology and Biology*, *Man and Biosphere*, *Microorganisms and Environment*, *Space Technology and Environmental Monitoring*.

The first article in the rubric "*Ecological and Sustainable Agriculture*" presents information about the principles of organic farming, which is based on the dynamic relationship between soil, plants, animals, people and the environment. The main goal of the organic farming system is also emphasized, namely to support the natural cycles of life without damaging nature. The main principles and characteristics for the sustainable development of organic farming are indicated, with the concept of soil as a biological system taking center stage. The second one describes the creation of three well-known companies engaged in Environmental Engineering. Applications of ecological engineering methods to Regenerative Agriculture are presented with three projects included as examples. Results of these projects clarify the importance of ecological engineering methods for Circular Solutions in ecology. According to data from the Bulgarian Association of the Metallurgical Industry, Bulgaria ranks sixth in the European Union in terms of heavy metal production and processing. In some areas, heavy metal pollution greatly worsens soil fertility, as is the case with the soils in the area of the Copper Mining Plant in the Srednogorie region. The third article presents results of studies that establish acidification and accumulation of copper mainly in the surface layer of the soil and in the zone of mechanical displacement up to 30 cm. Vegetation experiments were conducted with arable and subsoil from the "Garden" area, as indicator crops are corn, alfalfa, turnips and peas.

The current state of the art in the modelling of anaerobic digestion (AD) in continuously stirred tank reactor is reviewed in the rubric *Bioautomatics and Bioinformatics*. The key areas that require further research endeavours are identified. This review discusses AI applications for AD process modeling as well. A critical comparison is made with some of the popular mathematical models and algorithms for monitoring and optimization designed on their basis. The review presents also future research directions in this area. The second article focuses on fuel cells, which are increasingly recognized as promising alternative energy sources due to their high efficiency, low emissions, and suitability for a wide range of applications. The paper addresses the design of an active fault-tolerant control strategy for polymer electrolyte fuel cell systems exhibiting time-delay characteristics. An adaptive observer-based approach is proposed using a linear variable-parameter model and unknown-input monitoring techniques to estimate actuator failures and generate residuals.

An interesting article of the rubric *Forest Ecology and Biology* represents one of the most significant challenges in forest management, both from an economic and silvicultural perspective, namely forest fires. The implementation of reforestation measures aimed at restoring destroyed forest ecosystems necessitates comprehensive studies on the changes in soil composition and properties. More information could be achieved following the dynamics of changes in the composition and properties of Cinnamonic Forest soils (Chromic Luvisols) affected by wildfires in Southwestern Bulgaria.

A very fascinating is the meeting with elephants in the rubric *Man and Biosphere*. These exotic animals are vital to their ecosystems, acting as keystone species and ecosystem engineers that help maintain biodiversity and ecological balance. Their presence and behavior significantly influence the structure of their ecosystems, maintaining the balance of different plant and animal species, enriching biodiversity. In the presented article, the importance of elephants for nature and humans in the areas they

inhabit is reviewed regarding the main anatomical and behavioral features, specific care in zoo breeding, etc. The importance of climatic factors in the respective regions was also highlighted.

In the rubric *Microorganisms and Environment* in vitro studies of the enzyme chitinase for inhibitory effect on oval fungi *Sacharomyces cerevisiae* and *Candida albicans* are performed and reported in order to assess its prospect of practical application as an antimycotic agent. Due to the widespread use of antibiotics worldwide in humans and animals and the subsequent dysbacteriosis, mycoses are becoming increasingly prevalent and important in infectious pathology which makes this research particularly relevant and significant.

The advantages of fractal analysis to characterize the topographic complexity of the Republic of Bulgaria are outlined in an article from the rubric *Space Technology and Environmental Monitoring*. By using contour lines derived from a high-resolution Digital Elevation Model (DEM) is evaluated the fractal dimension (FD), estimated via the box-counting method. It serves as a quantitative indicator of spatial heterogeneity across different hypsometric belts and relief types. The reported findings contribute to a deeper geomorphological understanding of Bulgaria's terrain and demonstrate the utility of fractal metrics in regional landscape analysis.

Enjoy reading and welcome!

Prof. Hristo Najdenski
Member of BAS
Editor-in-Chief