Dear Readers

We present you with the next edition of the monograph Modern Problems and Solutions in Environmental Protection. The book you have received was created as a result of the 16th international interdisciplinary conference "Current Environmental Issues – 2021" organized in cooperation with the Faculty of Biology and Ecology of the Yanki Kupala State University of Grodno during the period 24-26th September 2019 at the Faculty of Biology and Chemistry of the University of Bialystok.

The current year – 2021 – is a specific pandemic year. The ongoing covid-19 pandemic has forced the organization of the CEI-2021 conference online. We did not have the opportunity to meet face-to-face, exchange thoughts, ideas and achievements. But the prevailing state of a pandemic does not release the academic community from dealing with, caring for, and researching the state of the natural environment, on the contrary, it creates new problems related to the new pollutants e.g. massive amounts of used masks, the use of new disinfectants, virus biology research, their mutations, etc. Problems that have arisen in the last 12 months, you can count indefinitely.

The main goal of the monograph was to present the most recent results of the participants' scientific activity during the last 12 months. As the broadly understood protection of the environment and natural resources is multidimensional, covering issues from chemical, biological, and econometric analysis, or environmental management, to education, the presented monograph also reflects this complexity. Therefore, the content discussed in the monograph is very diverse. The monograph is divided into three parts. The first part deals with chemical analysis, the second with issues related to microbiology, ecology, botany, and the third with environmental education.

The monograph begins with a chapter devoted to issues related to the problem of reducing nitrogen oxides. For this purpose, a catalyst based on natural zeolite such as clinoptilolite was proposed. The stability of the catalyst was checked by XRD methods. The efficiency of the proposed catalyst was checked. It was stated that raw, as well as modified by iron species, catalyst exhibited a high rate of NOx conversion.

The next chapter presents the current state of achievements in the field of application of ion-selective electrodes for nitrates determination. The importance of the development of simple, fast, and reliable methods for their content determination in environmental samples was presented.

The third discusses commercial methods of production of polycarbonates. The advantages and disadvantages of applied reactions are presented and their environmental and human health impact is assessed.

The fourth chapter deals with the electrochemical determination of indium(III) ions in environmental aqueous samples. The influence of the type of electrodes used at the limit of detection is discussed. The procedures applied different working electrodes: a mercury film electrode with a silver substrate (Hg(Ag)FE), a lead film electrode (PbFE), and a bismuth film electrode (BiFE) were compared. The influence of substances naturally present in aqueous

samples was checked. All presented procedures were validated and applied to the analysis of certified reference material and surface waters taken from the surroundings of Lublin.

The next chapter deals with the problem of recovering rare earth elements from waste materials. For this purpose, an alginate-based biosorbent (named alginate-biochar composite/ ALG-BC) is proposed. The efficiency of lanthanum (III) preconcentration and recovery were checked. The parameters that influenced the sorption process of La(III) were evaluated.

The second part of the monograph begins with work discussing the phenomenon of bacterial opportunism. As opportunistic human pathogens can contribute to a significant reduction in the effectiveness of treatment with antibiotics and antimycotics, their influence on human health and the spread of bacterial and fungal infections cannot be ignored. This subject is continued in the next chapter where the environmental problems caused by cyanobacteria are discussed. Their negative impact on surface water quality as well the conditions of aqueous organisms is presented.

The eighth chapter is devoted to dogs' and cats' health issues. The Authors looked at some factors that allowed to identify patterns of occurrence and development of various diseases and to predict their dynamics in connection with changes in the complex conditions of their habitat.

Chapter nine presents the results of research on the number and activity of bacteria in Lake Hańcza in northern Poland. The analysis of these parameters was carried out both in the vertical section of the water body and horizontally in individual water zones. The study was carried out in early September 2018. Neither horizontal nor vertical changes in bacterial number were observed. There were recorded only some differences in bacterial abundance in samples taken from two coastal sampling points located in the southern part of the lake at the direct catchment area with commercial development.

Chapter ten focuses on differentiation of bacterioplankton in 23 lowland springs at protective area of Gryżyński Landscape Park (western Poland). Authors present relationships between hydrogeological, hydrochemical features and development of water bacteria in spring niches. This study shows that microbiological parameters can be used as important indicators of ecological status of groundwater condition.

The next chapter deals with studies on long-term changes of crustacean zooplankton communities in Lake Wigry. There are summarized 100 years of observation of zooplankton structures in relation to the changing trophic conditions. As a result, the qualitative and quantitative changes during the last century can be summarized and some conclusions regarding the development prospects of some species can be made.

The twelfth chapter presents the results of studies of some ground beetles of the genus Coleoptera and Carabidae in 6 provinces of Russia and Belarus. The provided data was based on morphimetric traits. The presented results concern nine species for which the left and right sides were measured and the variable asymmetry (FA) parameter was estimated. It was found that the size of FA changes depended on the biotope, species, and interactions between them.

In eudominant of arable lands biotopes – Poecilus cupreus – the highest values of FA were recorded in the meadows, being about equal in all types of crops.

The next chapter presents results of observation of the influence of the secondary succession of cleared bilberry pine forest on changes in bird population. The fieldwork was performed in the years 1996–2018 applying conventional bird counting methods. It was found at the beginning the bird population comprised European, European-Turkestan, and Palearctic types of fauna. The diversity of species has changed over the years and is now dominated by the European types of fauna.

Chapter 14 discusses the problems associated with the invasive species, the American mink. The action of catching these animals was carried out in 13 fish pond complexes in February-April 2021. The caught specimens were tested in order to determine the genetic diversity and origin of the wild American mink population in the south-eastern part of Poland. The action of trapping mink will continue this fall.

This part ends with Chapter 15 on conditions for rational use of medicinal plants. For this purpose, it is necessary to define the phytocoenotic limitations of a species and information about its productivity in various communities. Such an analysis is presented based on the example of yarrow (Achillea millefolium L.). its occurrence, the association of communities with phytocoenoses and the impact of the most important environmental factors on them, as well as the frequency of occurrence, phytocenotic activity, the average predicted coverage and productivity in various types of communities have been determined.

The last part of the monograph concerns problems related to modern methods of teaching about the environment and for the environment. The Authors of chapter 16 present their experiences with the participation of students of secondary school no 12 in Grodno in the local environmental ecological initiative "URA Grodno!". As part of this initiative, the project "Public involvement in environmental monitoring and improvement of environmental management at the local level", financed by the EU and implemented by UNDP in cooperation with the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus, was implemented.

The last chapter discusses the competences in biology that a graduate of Belarusian secondary schools should demonstrate when applying for medical, biological, environmental or agricultural studies. The subject teachers are responsible for the preparation for the central test examination in Belarus and the candidate's success depends on their work. Each teacher has a task: to organize the work in such a way that the graduate can get the maximum grade from the test. The teacher, guided by the students' skills, selects forms, methods and techniques of work to achieve the highest effect. Preparation for the centralized test begins in 7th grade, when students start learning botany. Using the example of the subject block "Zoology", the article presents methods of using the competency approach in the lessons.

We hope that the monograph we have prepared, due to the variety of topics, will interest many specialists dealing with various aspects of both ecology and environmental protection.

Editorial team