Enviro Chem

3. INTERNATIONAL ENVIRONMENTAL CHEMISTRY CONGRESS

01-04 November 2021 Kemer ANTALYA

ABSTRACTS AND PROCEEDINGS E-BOOK

FOREWORD

3rd International Environmental Chemistry (EnviroChem) Congress

We are proud to organize our third congress by the Turkish Chemists Society under the title of Environmental Chemistry. As will be remembered, we organized our first congress with the title of 1st Eurasian Environmental Chemistry Congress in 2018 and our second congress with the title of 2nd International Environmental Chemistry Congress in 2019. This year, the third of our congress was held under the title of 3rd International Environmental Chemistry Congress (EnviroChem).

This congress was organised by Erciyes University, Karadeniz Technical University and Muğla Sıtkı Koçman University. The main purpose of this congress was to establish a warm environment to share cutting-edge information on developments in all areas of environmental chemistry research. The congress aims to bring together researchers from the entire spectrum of the multi-disciplinary fields of environmental chemistry and establish effective means of communication between them. This year we had participants from Algeria, Azerbaijan, France, Germany, Iran, Kosovo, Morocco, Russia, Nigeria, Palestinian, Pakistan, Tatarstan, Turkey, Tunisia, Ukraine, UK and USA. Eight invited speakers and more than 120 researchers presented their research work as oral/poster presentations.

On behalf of the organizing committee, we would like to thank you all for joining us and contributing to the success of the EnviroChem 2021. As an integral and significant part of this conference, your attendance added tremendous value. We also greatly acknowledge Ness İletişim, SEM, Terra, Redoks, ChromaScience and Naz Laboratuvar for their very generous sponsorships and supports in the organisation of 3rd International Environmental Chemistry Congress (EnviroChem).

Last but not the least we greatly appreciate the contributions of the local Organizing Committee who have spent their energy on the success of this congress. We want to thank Mirage Park Resort (Göynük, Kemer, Antalya/Turkey) for their excellent services.

Best wishes.

Prof. Mustafa SOYLAK (Chair)
Assoc. Prof. Ali ALKAN (Co-Chair)
Assoc. Prof. Ahmet DEMIRAK (Co-Chair)

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SHORT ORAL PRESENTATIONS (SOP)

SOP – 3

Universal Limno-Ecological Classification as A Tool for Modeling Water Bodies in The Ecological Frame of Green Urban Areas

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One of the most difficult theoretical issues of forming an ecological framework twin of urban areas is the methodology of the natural objects database. Water bodies are especially significant from the point of view of sustainable development of territories. Limnosystems determine the sustainability of natural biodiversity of urban flora and fauna. Limnosystems dampen the technogenic negative impact on the environment, serve as a recreational area. At the same time, occupying a fairly large area, limnosystems are among the first to be exposed to anthropogenic impact and degrade under the influence of negative external factors. In such conditions, it is especially important to conduct continuous monitoring of the state of limnosystems with automated monitoring of the dynamics of the state of key classification signs and external factors. The successful solution of this problem is directly determined by the classification method, the range of controlled parameters and their details. Currently, there are a large number of classifications in which the prescribed characteristics of water bodies are laid[1]. Among them one can find qualitative, genetic (by origin), morphometric, thermal, hydrological, hydrochemical, hydrobiological, etc. Such limnological classifications, which assess the lake by one parameter, can be considered as one-parameter. Multiparameter classifications are extremely rare and are essentially universal. Data processing techniques should ensure the intensive development of primary converters, computing technology and the widespread use of fuzzy logic, machine learning and artificial intelligence[2]. For this reason, the task was set to create a universal limno-ecological classification (ULEC), suitable for classifying the lakes of the world.

To create a universal limno-ecological classification (ULEC), the classical criteria have undergone significant revision and have been supplemented by a geographic zone, altitude, water mixing mode, hydrogen index, and a number of other criteria. ULEC for lakes on a global scale generally takes into account 7 parameters and 15 features. With a view to further machine processing, the criteria coding method was revised: to designate a feature, the first letter of its name in the corresponding version is used. Each feature includes from 4 to 18 indicators. Each parameter has its own rationale, which is an application of the classification with an indication of the literary source. As a result, the structure of the classification has the following form: 7 parameters, 15 features, 84 indicators, a total of 8820 differentiated states. The universal limnological classification takes into account all the main components of lakes, the type of lake in the form of a single formula and can be used on a global scale. The possibilities of using ULEC for the typification of lakes are shown on the example of the lakes of the Middle Volga region, Russia, and the world lakes from different continents.

Nizhny Kaban lake (Kazan, Russia) - Z_3 H_2 $G_{5\text{-}6}$ A_4 D_3 W_4 T_3 Mix_1 Tw_5 M_4 $I_{2(1)}$ Ph_3 Tr_5 Fl_3 Fa_3 - zonally moderate, old-karst, small (56 hectares), medium-deep (up to 16 m), drainless, warm-water, dimictic, with very low water transparency, oligohaline, sulphate-calcium, with alkalizing waters, hypertrophic (presence of hydrogen sulphide at the bottom), macrophytic with low species diversity (20 macrophyte species, 150 phytoplankton species), fish (8 fish species, 71 zooplankton species), with background fish species.

Baikal lake (Russia) - Z_3 H_3 G_1 A_1 D_1 W_1 T_2 Mix_1 Tw_1 M_2 $I_{1(1)}$ Ph_1 Tr_1 Fl_2 Fa_1 - zonally moderate, tectonic, very large (31500 km^2), with very great depth (1637 m), flowing, moderate in temperature regime, dimictic, with very high transparency of waters, low-mineralized, hydrocarbonate-calcium, with normal, neutral waters according to the reaction of the environment, ultraoligotrophic, macrophytic with a rich species diversity (133 species of endemic plants), fish (52 species of fish) with rare species of fish.

Lake Beysehir (Turkey) – Z_2 H_4 G_1 A_2 D_4 W_2 T_4 $Mix_?$ Tw_3 $M_?$ $I_?$ $Ph_?$ $Tr_?$ Fl_2 $Fa_?$ – zonal subtropical, tectonic, large (656 km2), shallow (10 m), inflow, very warm in temperature, with medium transparency of waters, macrophytic with rich species diversity, fish (12 species of fish).

The main difference between the universal limno-ecological classification (ULEC) is multicriteria, high discreteness and the combination of all signs of the classification of lakes in the form of a single formula, which allows the use of machine data processing methods for large-scale typification of lakes in different regions of the world. ULEC can be used for large-scale zoning of large territories, for comparative analysis of measurements taking place with lakes, for monitoring, statistical and mathematical data processing, and development of programs for sustainable development of urban areas.

References:

1) Birk, S., Bonne, W., Borja, A., Brucet, S., Courrat, A., Poikane, S., Solimini, A., Van De Bund W, Zampoukas N., Hering, D., 2012. Ecological Indicators, 18, 31-41.
2) Icaga, Y., 2007. Ecological Indicators, 7(3), 2007, 710-718.