DOI: 10.46991/JISEES.2025.SI1.174

Ecological Status of Mountain Lakes in the Lori Region (Armenia): Microalgae as Bioindicators of Water Quality

Lusine Hambaryan[1,2], Tigran Yesayan[2], Ani Harutyan[2],
Diana Hakobyan[2], Małgorzata Poniewozik[3*]

[1] Scientific Center of Zoology and Hydroecology, Yerevan, Armenia
[2] Faculty of Biology, Yerevan State University, Yerevan, Armenia
[3] Department of Plant Physiology and Biotechnology, Faculty of Medicine, The John Paul II Catholic University of Lublin, Poland

ABSTRACT

Small lakes (average depth 4.7–7 m) serve as important natural reservoirs, providing habitats for numerous species and offering significant potential for ecosystem services. The lakes of the Lori Plateau occupy an intermediate position between classical lakes and wetland ecosystems. However, due to anthropogenic factors and climate stressors, they face a serious risk of degradation. One of the most alarming manifestations of this process is the recurring algal blooms, often accompanied by hypoxia in deep layers. Analyzing the spatial and temporal heterogeneity of phytoplankton distribution in these lakes is crucial for assessing their ecological state and managing water quality. Climate change plays a major role in influencing phytoplankton dynamics, as it extends the growing season, leading to an earlier onset of stratification and subsequent algal blooms in spring (Winder, Sommer, 2012; Berge et al, 2020). The first detailed phytoplankton monitoring, conducted in the lakes Urasar, Konsky (Horse) Liman, and Prozrachny (Clear) Liman in 2023–2024, revealed a broad diversity of species belonging to key groups: Cyanobacteria, Bacillariophyta, Chlorophyta, and Euglenophyta and . In total, over 120 species were identified, 85% of which serve as biomarkers of eutrophication and indicators of various saprobity degrees. Among them, cyanobacteria and euglenophytes dominated the phytoplankton community. Using advanced scanning electron microscopy (SEM), 24 previously unrecorded species of the genus Trachelomonas were identified in Armenia's algal flora for the first time. Saprobity indices ranged between 1.6 and 1.3 (with the highest values recorded in 2023), while the Shannon index was 1.8–2.3 (peaking in 2024). Algal biomass reached 4.3–10.5 g/m³, characterizing these water bodies as mesoeutrophic. For sustainable water resource management in the region it is essential to consider the biodiversity of autotrophic organisms and the dynamics of their development. Regular monitoring and conservation strategies for the small lakes of the Lori Plateau will not only help preserve aquatic ecosystems, but also contribute to climate adaptation efforts, mitigating environmental change impacts on regional water systems.

Keywords: mountain small lakes, phytoplankton biomarkers, euglenoids iorica, climate adaptation

Acknowledgement: The work was supported by Yerevan State University as part of the research project «Assessment of microplastic pollution in different water bodies of Republic of Armenia and analysis of the state of bioindicator microalgae as a result of this impact» (internal grant 2023-2025).

References:

1. Winder, M.; Sommer, U. Phytoplankton response to a changing climate. *Hydrobiologia* **2012,** *698*, 5–16. DOI:10.1007/s10750-012-1149-2
2. Johnsen, G.; Leu, E.; Gradinger, R. Marine Micro- and Macroalgae in the Polar Night. In: *POLAR NIGHT. Marine Ecology*. **2020,** 67–112. DOI:10.1007/978-3-030-33208-2_4

*Corresponding Author:

Małgorzata Poniewozik, Department of Plant Physiology and Biotechnology, Faculty of Medicine, The John Paul II Catholic University of Lublin ul. Konstantynów 1i, 20-708 Lublin, Poland.
Email: malgorzata.poniewozik@kul.pl