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FORMING ECOLOGICAL THINKING AND PRACTICAL SKILLS IN FUTURE SPECIALISTS THROUGH THE STUDY OF HYDROCHEMISTRY IN WATER BODIES

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The limited availability of freshwater resources and the uneven spatial distribution of their reserves on Earth, coupled with increasing water consumption, pollution, and climate change, is progressively turning into a global issue of drinking water scarcity. Global climate change, along with worsening natural moisture supply and declining

river water content, is leading to a deterioration in the ecological condition of river basins. Concurrently, the frequency and magnitude of river runoff fluctuations are increasing, along with the risks of destructive floods and high waters [1, p. 11].

The limited availability of water resources in Ukraine necessitates the implementation of management principles, integrated use, and water protection measures that align with modern European requirements. Particular attention must be paid to managing the quality of river basin water resources through comprehensive ecological assessments, including evaluations of physical properties, chemical composition, and hydrobiological characteristics [2, p. 3].

Considering both the quality and quantitative assessment of natural water resources is crucial for planning water management and related measures. This is because economic activities alter the composition and properties of natural waters due to wastewater discharges containing various mineral and organic compounds, as well as pollutants originating from agricultural lands, industrial and household waste sites, and the atmosphere [3, p. 6].

The development of modern aquaculture and the management of aquatic bioresources demand that specialists possess a high level of competence in ecological monitoring and the assessment of aquatic ecosystem conditions. The study of hydrochemical characteristics of natural and artificial water bodies represents an essential stage in preparing future specialists, enabling the development of core skills such as data analysis, the evaluation of anthropogenic impacts, and informed decision-making to optimize ecosystem conditions.

To develop practical skills, students used the results of hydrochemical research on water samples from a quarry and the Dnipro River within the city of Dnipro. The parameters analyzed included the hydrogen index (pH), turbidity, total mineralization, electrical conductivity, and concentrations of chlorides, nitrates,

magnesium, calcium, and iron. Laboratory studies were conducted using modern instruments that meet international standards.

The research results demonstrated significant variability in the hydrochemical characteristics between the quarry and the Dnipro River. Quarry water was characterized by higher turbidity (9.5 NTU), nitrate concentrations (16.6 mg/dm^3), and total mineralization (707 mg/dm^3), indicating a notable impact of anthropogenic activity. In contrast, the Dnipro River exhibited lower levels of these indicators, reflecting greater stability in its ecosystem. These findings helped students understand the influence of natural and artificial factors on water quality and adapt analytical methods to specific conditions.

Working with real water samples fostered several professional competencies, including practical skills in field and laboratory methods of water analysis, analytical thinking in identifying the primary factors affecting water quality, an ecological approach to water resource management, and interpreting research results to make informed decisions in aquaculture.

The data obtained underscored the importance of systematic monitoring of water hydrochemical characteristics to identify potential ecological threats. For instance, elevated levels of nitrates, chlorides, and total mineralization in quarry water highlighted the need for stringent quality control in artificial water bodies.

Participation in this research helped students develop critical competencies essential for aquaculture professionals, including proficiency in using modern water analysis equipment, interpreting ecological indicators, and assessing the conditions of aquatic ecosystems.

Analyzing the relationships between the physicochemical parameters of water and ecosystem conditions allowed students to appreciate the role of ecological monitoring in ensuring the sustainable development of aquatic bioresources.

The conducted research serves as an effective tool for integrating theoretical knowledge with practical activities, providing training for specialists capable of adapting to modern challenges in aquaculture and water resource management.

Thus, incorporating hydrochemical analysis data into the educational process promotes the comprehensive preparation of competent and environmentally conscious specialists who can effectively work in the field of aquatic bioresources and aquaculture. This approach strengthens the integration of science, education, and practice, which is crucial for the successful development of the sector.

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