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WATER RESOURCES OF LVIV REGION AND THEIR ECOLOGICAL STATE

The description of present ecological state of natural water resources of Lviv region using the current literature data and materials of the State Department of Environmental Protection in Lviv region, as well as the results of author's own investigations in this area are presented in the article. Substantial attention is paid to the analysis of ecological challenges for water supply and anthropogenic factors that cause the deterioration of water quality in the region. The article emphasizes the necessity of protective measures realization to improve surface water ecological status, and to prevent the anthropogenic pollution of water bodies and watercourses due to industrial and agricultural activities in the region.

Key words: *Lviv region, water resources, ecology, environmental protection*

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ВОДНЫЕ РЕСУРСЫ ЛЬВОВСКОЙ ОБЛАСТИ И ИХ ЭКОЛОГИЧЕСКОЕ СОСТОЯНИЕ

В статье представлено описание современного состояния водных ресурсов Львовской области с использованием данных научной литературы и материалов Государственного управления охраны окружающей среды в Львовской области, а также результатов исследований, проведенных автором. Значительное внимание в статье уделено анализу экологических проблем водоснабжения и антропогенных факторов, которые вызывают ухудшение качества поверхностных вод на территории Львовской области. Подчеркивается существенная необходимость реализации комплекса эффективных защитных мер с целью улучшения экологического состояния поверхностных вод, а также для предотвращения

антропогенного забруднення водоемов и водотоков вследствие промышленной и сельскохозяйственной деятельности на территории области.

Ключевые слова: Львовская область, водные ресурсы, экология, охрана окружающей среды

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ВОДНИ РЕСУРСИ ЛЬВІВСЬКОЇ ОБЛАСТІ ТА ЇХ ЕКОЛОГІЧНИЙ СТАН

У статті поданий опис сучасного стану водних ресурсів Львівської області з використанням даних наукової літератури та матеріалів Державного управління охорони навколишнього середовища у Львівській області, а також результатів власних досліджень автора у цій галузі. Істотна увага в статті приділена аналізу екологічних проблем водопостачання та антропогенних факторів, які зумовлюють погіршення якості поверхневих вод на території Львівської області. Підкреслюється необхідність реалізації комплексу ефективних захисних заходів з метою поліпшення екологічного стану поверхневих вод, а також для запобігання антропогенного забруднення водою і водотоків внаслідок промислової і сільськогосподарської діяльності на території області.

Ключові слова: Львівська область, водні ресурси, екологія, охорона навколишнього середовища

Problem statement. Water resource management and protection from anthropogenic pollution due to industrial and agricultural activities are the important environmental issues. The challenges for adequate water supply are acute in Ukraine, as it occupies one of the last places among the European countries by the water resources per person [1]. The problem of insufficient water supply is exacerbated by contamination of surface waters that takes place in several regions. In particular, a number of ecological challenges are related to hydrological resources management in Lviv region, which belongs to the most urbanized regions of Western Ukraine and possesses more than 3 400 industrial facilities, including the environmentally hazardous objects [2]. Various water quality problems (organic pollution, eutrophication, acidification, toxic contamination) in the region have become acute for the last decades.

Objective of research. The aims of this study were to analyze the present environmental problems of surface water resources and the main issues related to deterioration of water quality in the Lviv region.

Results and discussion. A natural water supply in Lviv region is the average for Ukraine and makes up 226 000 m³/km² per year (local flow), and the amount of water per person is 1.82 thousand m³ per year. Overall, the surface waters in the region consist of more than 8 950 rivers, streams and springs totaling 16 343 km at length, and 2095 ponds which surface area accounts for 0.5 hectares per 1 km² of territory [4, 5, 6]. The Lviv region is situated within the Main European Watershed, and the rivers of the region belong to the basins of the Black (the Dnister, the Stryi) and the Baltic (the Zakhidnyi Buh, the Sian) seas. The river network is represented mostly by the small rivers, which are the tributaries and sources of water for the medium and large rivers [1, 4]. The largest number of rivers belong to the catchment basins of the Dnister river (5 838) and the Zakhidnyi Buh river (3 213), and a small number of rivers belongs to the basin of the Sian river (Fig. 1) [7]. The results of scientific research show that the surface waters, especially the small water bodies and watercourses, are the most polluted components of natural environment in Lviv region [3].

The water quality issues confronting surface water resources in the region include major types of pollution that are unregulated or uncontrolled. Most of the water quality problems arise due to the presence of great variety of inorganic and organic pollutants discharged from point sources within industrial and urban areas, and diffuse pollutants from unregulated nonpoint sources, resulting from various anthropogenic activities that take place in the region (agriculture, deforestation, logging, animal farming, mining, urban runoff, wastewater treatment facilities). In addition, such factors as chemical contamination of soil and atmosphere, the changes in landscape structure, technological loading of the territory and urbanization have played an important role in deterioration of freshwater resources quality for the last decades.

As it is known, water pollution can negatively affect all levels of the aquatic ecosystems functioning in water bodies and watercourses, and cause the lowering of their productivity and reducing species diversity. Contaminated surface water can also affect the health of humans and farm animals as well as aquatic organisms, like fishes, able to accumulate and concentrate contaminants in their bodies. Consequently water contamination affects the performance and quality of aquaculture, resulting in economic losses. Thus the activities directed on the control and improvement of environmental state of surface waters, their protection and restoration are especially important.

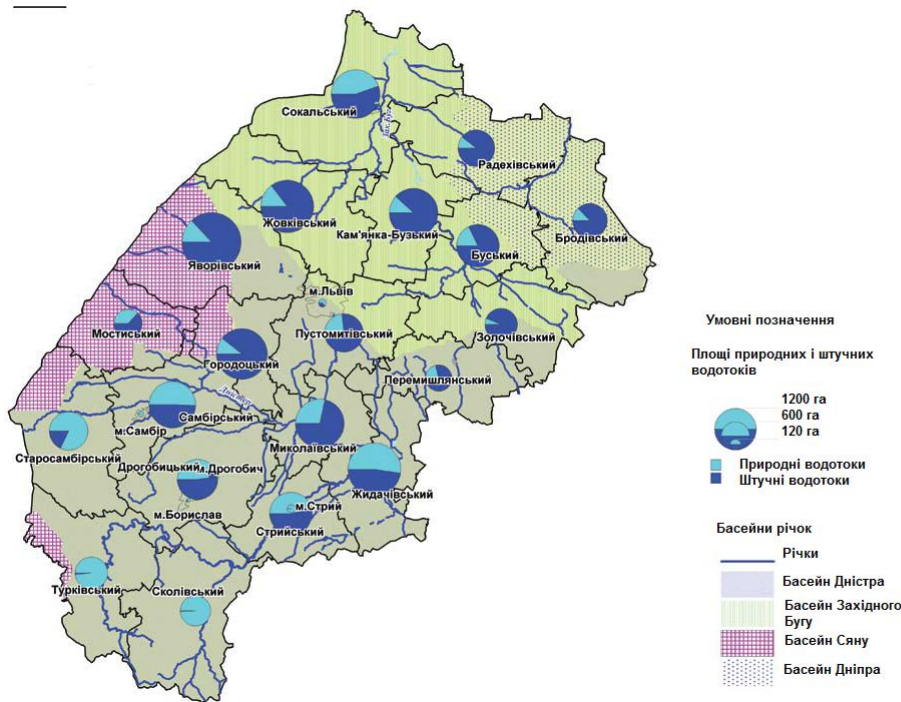


Fig. 1. Water resources of Lviv region (modified from the Ecological Atlas of Lviv region (ed. by B. M. Matolych) [4])

One of the major environmental issues of Lviv region is insufficient wastewater treatment before the dumping into surface water bodies. The Lviv region occupies the 9th place among other regions for discharges of insufficiently treated and untreated sewage into open waters [8]. Nowadays, the cities like Sambir, Yavoriv, Khodoriv, Turka, Staryi Sambir, Radekhiv, Stryi, Busk, and Peremyshliany, have very critical state of sewage treatment [4]. There are several product pipelines and oil pipelines coming through the region: “Druzhba” oil pipeline, Drohobych-Kalush product pipeline of the “Poliolefin”,

“Oriana” OJSC, “Lukor” CJSC, “Prykarpattya-Zakhid-Transnafta-Product”. These objects belong to the most environmentally hazardous ones [8]. Under the current legislation, organizations using the water and enterprises the activity of which has a negative impact on hydrological objects are obliged to protect water resources from pollution. This legislative provision is the essential basis for implementation of water protection measures.

The lack of cartographic materials and the vagueness of water protection zones and coastal protection belts of water objects also contribute to pollution of surface waters in Lviv region [3]. Therefore, it is necessary to solve the problem of determining the size and scope of water protection zones and coastal protection belts along the rivers and basins in the region. Estimated area of coastal protection belts of the region makes 66 568 hectares. Taking into consideration an average value of the above work it requires significant investment.

Conclusions. The surface waters belong to the most polluted natural resources in Lviv region. Therefore problem of keeping the adequate ecological status of water bodies and watercourses is extremely urgent. The hydrological resources are influenced by different factors and can be affected, in particular, by the pollution of soil and atmosphere, the landscape structure change, technological loading of the territory, the vagueness of water protection zones and coastal protection belts of water objects, the dropping of insufficiently treated and untreated sewage into the open waters. The improvement of environmental status of water resources in Lviv region demands the implementation of a number of effective measures, which require significant investment.

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INFLUENCE OF FEED SUPPLEMENTS OF MEVESEL AND METIFEN ON LEVEL OF LIPID PEROXIDATION PRODUCTS AFTER CADMIUM LOADING OF BULLS

The level of intermediate and final products of lipid peroxidation in chronic cadmium toxicity. We established antioxidant properties of feed additives of metifen and mevesel in young cattle under cadmium stress.

Key words: *cadmium intoxication, an antioxidant, cadmium, lipids, malondialdehyde, conjugated diene, feed additives.*