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*M.G. Shcherban, V.A. Kapustnyk, V.V. Myasoyedov, M.I. Lytvynenko,
K.A. Krivonis, O.G. Vasenko*

Kharkiv national medical university

ECOLOGO-HYGIENIC CONCEPT AND PREVENTIVE MEASURES FOR THE PROTECTION OF WATER RECREATIONAL AREAS OF RIVER SIVERSKYI DONETS

The ecological-hygienic concept and preventive measures for the protection of recreational water areas of the river Siverskyi Donets, the main recreational reservoir in Kharkiv region, have been substantiated and developed. It has been identified that poor health and environmental status of the recreational waters of the river Siverskyi Donets requires the full implementation of the actions foreseen and recommended by the ecological-hygienic concept.

Key words: *recreational water areas, the river Siverskyi Donets, the ecological-hygienic concept of protection and recovery.*

It is known that the special role in the problem of recovery and mass recreation belongs to water reservoirs. The opportunity to do a variety of activities and attractions, microclimatic comfort, aesthetic effect of coastal landscapes, changing impressions – all of them, acting in combination, contribute to the fact that the reservoirs can be considered natural clinics. That is why most recreational establishments are located directly on the banks of the ponds or near them [1].

One of the main natural factors which determines the recreational suitability and value of water reservoirs is placing them in a different natural-climatic zone. The geographical position, causing climatic conditions, largely determines the set of leisure activities on this water body and simultaneously limits in time certain activities and sports.

There is some general methodological approach that takes into account a variety of aspects of the development of water recreation and allows you to develop the ways of intensification of their recreational use for specific offshore-territorial complexes. The main idea of this approach is the scientific rationale and organization of targeted and intensive use of separate water areas and coastal zones of water bodies in accordance with their natural features, character and prospects of economic development, direction and intensity of anthropogenic impacts [2].

Experts of different profiles note that in the regions of Ukraine the selection, organization,

and recreational use of water resources in urban and suburban areas in modern conditions sometimes takes place spontaneously, without taking into account the sanitary and environmental situation, which leads on the one hand to the negative impact on health, and on the other hand to a significant excess of the allowable loads for recreation. In addition, the specialists notice the presence of large quantities of water recreations in the region that do not meet the sanitary legislation.

The above-mentioned problem is caused by a number of factors, among which the leading one is the absence of the official state systems of organization and control conditions recovery and mass recreation on recreational waters in the regions, the imperfection of the legislative base, and others; that makes impossible to properly carry out a large range of necessary administrative, commercial, economic, social, hygienic, environmental measures to improve the situation.

In modern conditions of the increasing independence of management in the regions the problem of substantiation of perspective directions of the development of recreational areas including water recreation is getting more urgent.

On the recommendations of the Ministry of Health of Ukraine, State Sanitary and Epidemiological Service and scientists of hygiene and environmental profile is important to develop

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long-term measures on the issues of health promotion and protection, and also the formation of sanitary-ecological mechanism of recreational use of surface waters.

The material and research methods. During 2013–2014 in KhNMU together with the specialists of the Ukrainian scientific research Institute of ecological problems in the target order of the Ministry of Health of Ukraine the research on the topic «Ecological-hygienic substantiation of optimal levels of anthropogenic pressure on recreational water areas» was conducted, the purpose of which was the scientific rationale, development and implementation in practice of sanitary-ecological concepts and practical preventive measures on the development and protection of recreational water areas that will help create regional administrative systems and control the conditions for recovery and public rest on water-based recreations [3].

The basin of the river Siverskyi Donets, the main recreational reservoir in Kharkiv region, was selected as a full-scale model for testing purpose and objectives of the ecological-hygienic studies.

The evaluation of water conservation measures at the sites of contamination of the basin of the river Siverskyi Donets was based on the use of requirements, regulated by the following normative documents: «Методичними вказівками з розгляду проектів гранично допустимих скидів (ГДС) речовин, що надходять у водні об'єкти зі стічними водами № 2875–83»; the law of Ukraine «Про забезпечення санітарного та епідемічного благополуччя населення», approved by the Verkhovna Rada of Ukraine from 24.02.1994, No. 4004-XII; the Law of Ukraine «Про охорону навколишнього середовища» (25.06.1991); the Law of Ukraine «Про питну воду та питне водопостачання» (від 01.01.2002 р. № 2918-III).

The condition of the basin of the river Siverskyi Donets, the water quality of the reservoir, the state water conservation measures were evaluated according to «Правила охорони поверхневих вод від забруднення зворотними водами» (від 25.03.1999 р. № 465); «Санітарних правил та норм охорони поверхневих вод від забруднення» (СанПиН 4630–88); the resolution of the Cabinet of Ministers of Ukraine from 18.12.1998, No. 2024 on «Правовий режим зон санітарної охорони водних об'єктів»; ГОСТ 2761–84 «Источники централизованного хозяйственно-питьевого водоснабжения. Гигиенические, технические требования и правила выбора».

The surface water quality of the basin of the river Siverskyi Donets was estimated on the basis of the data of the State Sanitary and Epidemiological Service that reflected the characteristic features of the mode of reservoirs in accordance with the time of the year [4]. The information from the environmental laboratories UkrSRIEP (Kharkiv, Ukraine) was also used, including the monitoring of the hydrological regime and sanitary state of the recreation areas of the river Siverskyi Donets in Kharkiv region.

The results of the research. Considering the water-diversified complex formation in the region, which includes water supply of the population, industrial, municipal and agricultural enterprises, thermal power plants, irrigated agriculture, fisheries, etc.; nowadays the water, sanitary and environmental problems in this region have become not only a regional, but also of the national importance.

The region has extremely low water availability and 1.8% of the total resources of Ukraine. The water resources of the region are formed by precipitation, local runoff, groundwater, and also due to external inflow from adjacent areas (transit waters of Russia).

Altogether there are 867 rivers, including the pool of the river Siverskyi Donets – 712, and 57 reservoirs and 2538 ponds.

About 80 lodges, resorts, camps, and also about 25 rural hotels, motels, hotel and restaurant complexes, which host vacationers in summer time, are located on the banks of the river Siverskyi Donets within Kharkov region.

On the territory of Kharkiv region there are 116 areas of recreation on water bodies, the overwhelming number of which is located on the river Siverskyi Donets.

According to the annual statistics of the SES, 781 water samples were selected from recreational water bodies in Kharkiv region in 2012; of which 172 samples did not meet the established standards for sanitary-chemical indicators, which is 22%. For microbiological indicators 1230 samples were selected, which did not conform to established standards of 139 samples (11%). In addition, lactose-positive *Escherichia coli* was found in 129 samples, and helminthiasis, which are dangerous for human, were detected in 12 samples.

In 2013, 81 out of 560 samples of water selected from recreational waters for sanitary-chemical indicators did not conform to established standards (15%). Microbiological indicators of 179 samples out of selected 694 water samples did not meet established standards

(lactose-positive *E. coli* was found in 178 samples (31 %).

The viral antigen of hepatitis A has been detected lately in the water samples from the Petrenkivskiy reservoir (Kharkiv, Zhovtnevyi district); in this connection SES service has banned the use of the beach by the population on the territory of the reservoir.

Also in connection with discrepancy water regulatory requirements SES service has temporarily banned the use of the beaches by the population in Zhovtnevyi, Zhuravliovskiy, Oleksiyivskiy parks (the recreation area of «Arizona», «Arkada»), as well as lakes Osnova and Bezliudovka.

The results of the research determined that the current health and environmental status of the whole basin of the river Siverskiy Donets and its water resources can be assessed as catastrophic, which complicates the socio-economic development of the region and adversely affects the health of the population. Further delay in taking effective measures aimed at stabilizing and improving the health and environmental situation in the basin of the river Siverskiy Donets, can lead to health and environmental disaster, significantly delay or prevent the economic development of the region.

The discussion of the research results.

According to the results of the research, the ecological-hygienic concept and preventive measures for the protection of the recreational water areas of the river Siverskiy Donets have been developed [5].

It has been determined that the waters of the river Siverskiy Donets are among the most polluted in Ukraine.

The basin of the river Siverskiy Donets is a developed industrial and agricultural region. The urbanization of the region is high enough [6, 7]. Therefore, a large number of water resources is needed to ensure the economic development requires. However, water availability in the region is low, and the intensity of use of the river flow exceeds the average level of use of the river flow to Ukraine twice.

The main causes of poor sanitary and environmental situation in the basin of the river Siverskiy Donets are:

- the high level of water pollution and degradation of aquatic ecosystems due to excessive anthropogenic load;
- the lack of or ineffective operation of sewage treatment plants, due to their overload and the use of outdated technologies;

- the wear of sewerage networks;
- the use of outdated production technologies with excessive consumption and consumption;
- the significant amount of contaminants from surface runoff from settlements and agricultural land to water bodies;
- the lack of a strategic plan for the protection and restoration of water bodies, the lack of consistency of immediate and long term targets;
- the absence of an integrated basin approach to solving environmental problems.

The main activities in the area of sanitary and environmental recovery and protection of recreational areas of the river Siverskiy Donets are the following:

- the increasing capacity of treatment facilities, pumping stations by their reconstruction, the introduction of more advanced technologies and efficient equipment, improving efficiency of their work, the replacement of emergency sewerage networks;
- the construction and reconstruction of treatment facilities;
- on the industrial enterprises, primarily in the coal industry;
- of a storm sewer and structures for share rainwater transmission to municipal treatment facilities;
- the erosion control structures construction (embankments, ditches, terraces, roads, trays-drops, spillways, dams, erosion control ponds sediment runoff, and so on);
- the completion of construction of environmental protection facilities of the high degree of construction readiness and putting them into action;
- the design and reconstruction of sludge complexes with the utilization of the methane produced in the digester;
- the certification of sewage treatment facilities in order to intensify their work and inventory drives industrial wastes and effluents;
- the use of economic and administrative impact of industrial enterprises in order to perform their environmental activities at their own expense and other financing sources;
- the assistance in the equipment of the production facilities by the means for monitoring the quality and volume of wastewater discharge and their pre-treatment;
- the improvement of sanitary and environmental safety and operational reliability of oil, gas and products pipelines;

- the ensuring of the implementation of environmental measures on environmentally dangerous objects;
- the introduction of contour and reclamation of the area of agricultural land;
- the conducting agronomic erosion control measures, revegetation, conservation eroded and industrial contaminated land, organizational and technical measures to prevent the issuance of the water bodies of organic and mineral fertilizers, pesticides, petroleum products, and so on;
- the establishment of water protection and protective forest plantations;
- the establishing control over a condition of clearing and landscaping cities, enterprises;
- the development of a system of evaluation of existing treatment facilities and accounting of urban storm water with the creation of an appropriate data base.

The implementation of the concept will allow:

- to significantly reduce the anthropogenic impact on water bodies in the basin of the river Siverskyi Donets and its ecosystem by limiting the negative impact of ecologically dangerous objects;
- to create and organize water protection zones and protection zones of water bodies with the aim the reduction of pollution and improvement of the environment;
- to reduce the amount of emissions and household objects, to built-up areas and agricultural lands;
- to improve the quality of water of water bodies by environmentally acceptable and sustainable use of water resources, the implementation of standards of sanitary and environmental security, which will contribute to sustainable water supply, proper satisfaction of drinking, domestic and other needs of the population and the needs of fisheries;
- to create an effective management system in the sphere of use and protection of waters and reproduction of water resources in the river basin with improved economic mechanism.

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Conclusions

1. It has been determined that the waters of the river Siverskyi Donets are among the most polluted in Ukraine. The basin of the river Siverskyi Donets is a developed industrial and agricultural region. The urbanization of the region is high enough. Therefore a large number of water resources is required to ensure that economic development. However, water availability in the region is low, and the intensity of use of the river flow exceeds the average level of use of the river flow to Ukraine twice.

2. The results of the research have determined that the current health and environmental status of the whole basin of the river Siverskyi Donets and its water resources can be assessed as catastrophic, which complicates the socio-economic development of the region and adversely affects the health of the population. Further delay the adoption of effective measures aimed at stabilizing and improving the health and environmental situation in the basin of the river Siverskyi Donets, can lead to health and environmental disaster, and also considerably slow down or prevent the economic development of the region.

3. On the basis of a systematic analysis and hygienic assessment, the ecological-hygienic concept of sanitary and environmental recovery and protection of recreational areas of the river Siverskyi Donets has been developed.

The promising research is further necessity to justify the algorithm of implementation in practice of the developed concept at the level of Kharkiv region – the city administration; the development and implementation in practice at the same level of the concept of the creation in Kharkiv region the centralized system of administrative control over the organization and proper conditions of health and public recreation on the recreational waters; the development and implementation at the level of the State Sanitary Epidemiology Service and the Ministry of Health of Ukraine of the new documents of sanitary and environmental legislation on the issue of supervision of water recreational areas.

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ЕКОЛОГО-ГІГІЄНІЧНА КОНЦЕПЦІЯ ТА ПРОФІЛАКТИЧНІ ЗАХОДИ З ОХОРОНИ ВОДНИХ РЕКРЕАЦІЙНИХ ЗОН БАСЕЙНУ РІКИ СІВЕРСЬКИЙ ДОНЕЦЬ

Обґрунтовано еколого-гігієнічну концепцію та розроблено профілактичні заходи з охорони водних рекреаційних зон головної рекреаційної водойми Харківського регіону басейну ріки Сіверський Донець. Визначено, що незадовільний санітарно-екологічний стан рекреаційних водойм басейну ріки Сіверський Донець потребує реалізації в повному обсязі заходів, які передбачено та рекомендовано еколого-гігієнічною концепцією.

Ключові слова: рекреаційні водойми, ріка Сіверський Донець, еколого-гігієнічна концепція, охорона і оздоровлення.

Н.Г. Щербань, В.А. Капустник, В.В. Мясоєдов, Н.И. Литвиненко, К.А. Кривонос, А.Г. Васенко
ЭКОЛОГО-ГИГИЕНИЧЕСКАЯ КОНЦЕПЦИЯ И ПРОФИЛАКТИЧЕСКИЕ МЕРОПРИЯТИЯ ПО ОХРАНЕ ВОДНЫХ РЕКРЕАЦИОННЫХ ЗОН БАСЕЙНА РЕКИ СЕВЕРСКИЙ ДОНЕЦ

Обоснована еколого-гігієнічна концепція і розроблені профілактичні заходи по охороні водних рекреаційних зон головного рекреаційного водоема Харківського регіону басейну ріки Сіверський Донець. Определено, что неудовлетворительное санитарно-экологическое состояние рекреационных водоемов бассейна реки Северский Донец требует реализации в полном объеме мероприятий, предусмотренных и рекомендованных эколого-гигиенической концепцией.

Ключевые слова: рекреационные водоемы, река Северский Донец, эколого-гигиеническая концепция.

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